COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY

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Submitted By

DR MANVIR SINGH

DEPARTMENT OF ORTHOPAEDICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA, PUNJAB

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled "**COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY**" submitted towards partial fulfillment of the requirements for the award of **MS in ORTHOPAEDICS** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Pankaj Mahindra**, Professor, Department of Orthopaedics, **Dr. Harpal Singh Selhi**, Professor, Department of Orthopaedics and **Dr. M. Rupinder Singh,** Professor, Department of Anaesthesiology. No part of this thesis has formed the basis for the award of any degree previously.

_____

Dr. MANVIR SINGH
Department of Orthopaedics
Dayanand Medical College & Hospital,
Ludhiana, Punjab

Date:

Place:

CERTIFICATE OF SUPERVISORS

This is to certify that the work incorporated in this thesis entitled "**COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY"** has been carried out by **Dr Manvir Singh** under our direct supervision. The data incorporated in this thesis is original and genuine and has been carried out by the candidate himself.

Signature of Supervisor

Dr. Pankaj Mahindra
Professor
Department of Orthopaedics
DMC&H, Ludhiana

Signature of Co-Supervisor

Dr. Harpal Singh Selhi
Professor
Department of Orthopaedics
DMC&H, Ludhiana

Dr. M. Rupinder Singh
Professor
Department of Anaesthesiology
DMC&H, Ludhiana

Date:

ENDORSEMENT BY THE HEAD OF THE INSTITUTE

This is to certify that the thesis entitled "**COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY "** is a bonafide research work done by **Dr. Manvir Singh** under the supervision of **Dr. Pankaj Mahindra**, Professor, Department of Orthopaedics, **Dr. Harpal Singh Selhi**, Professor, Department of Orthopaedics and **Dr. M. Rupinder Singh,** Professor, Department of Anaesthesiology in this institution.

Principal

Dr. G S Wander
Principal
DMC&H, Ludhiana

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Signature

Dr Manvir Singh
Department of Orthopaedics
Dayanand Medical College & Hospital,
Ludhiana, Punjab - 141001

Date:

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Dedicated

to

my Parents

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Dr. Manvir Singh

LIST OF ABBREVIATIONS

AE	Adverse events
AVN	Avascular Necrosis
CLIA	Continuous Local Infiltration Analgesia
HA	Hip Arthroplasty
HOOS	Hip disability and Osteoarthritis Outcome
LA	Local Anesthetics
LIA	Local Infiltration Analgesia
NRS	Numerical rating scale
NSAID’s	Non-steroidal anti- inflammatory drugs
OA	Osteoarthritis
ON	Osteonecosis
SLIA	Single-Injection Local Infiltration Analgesia
THA	Total Hip Arthroplasty
TKA	Total Knee Arhtroplasty
VAS	Visual analogue scale

ABSTRACT

Introduction: LIA involves high- volume intraoperative infiltration and intraarticular re-injections with a admixture of ropivacaine, ketorolac, and epinephrine. Intraoperative LIA with this admixture has been shown to give effective pain relief after TKA, but there are only limited data available on the analgesic effect after THA. Because of the variations in LIA, it's delicate to identify the ‘ utmost effective ’ element or factors. Therefore, farther studies are demanded to support standardization of LIA and its use along with combined spinal and epidural anesthesia.

Aims: To compare the functional outcome and pain assessment in the patients given local infiltration analgesia and not given local infiltration analgesia in total hip arthroplasty.

Material and Methods: This prospective study was conducted at Dayanand Medical College & Hospital, Ludhiana, from September 2022 to September 2023, including 47 patients undergoing total hip arthroplasty (THA). Patients were divided into two groups: Group 1 (20 patients) received local infiltration of anesthesia (LIA) combined with spinal and epidural anesthesia, while Group 2 (27 patients) did not receive LIA. The LIA cocktail included ropivacaine, adrenaline, ketorolac, and fentanyl. Statistical analyses involved various tests including Kolmogorov-Smirnov, Student t-test, Mann-Whitney U test, Chi-square, and Fisher's exact test, with a p-value less than 0.05 considered significant.

Results: The study evaluated the efficacy of local infiltration of analgesia (LIA) on post-operative pain management in total hip replacement patients. LIA significantly reduced VAS scores at rest and during dynamic mobilization immediately post-operation and at 24 and 48 hours, respectively. Patients with LIA required less and later rescue analgesia, indicating better pain management. No significant differences were found in demographic factors, recovery duration, quadriceps strength, or weight-bearing ability between patients with and without LIA. Age influenced the amount of rescue analgesia required, with older individuals needing more at specific post-operative time points.

Conclusion: Thus we conclude that LIA provides significant pain relief in the early postoperative period and hence is associated with higher patient satisfaction. LIA significantly reduces rescue analgesia requirement and thus reducing opioid-related side effects.The long-term effects of LIA use are yet to be studied.

Keywords: Total hip arthroplasty, local infiltration of anaesthesia, pain management, Visual analogue scale

TABLE OF CONTENTS

S. NO.	TOPIC	PAGES
I	INTRODUCTION	1-3
II	AIMS AND OBJECTIVES	4
III	REVIEW OF LITERATURE	5-20
IV	MATERIALS AND METHODS	21-27
V	OBSERVATIONS AND RESULTS	28-52
VI	DISCUSSION	53-59
VII	SUMMARY AND CONCLUSIONS	60-61
VIII	BIBLIOGRAPHY	62-68

APPENDICES – I

- PROFORMA
- MASTER CHART

APPENDICES – II

- APPROVAL LETTER OF THESIS PLAN
- THESIS PLAN

LIST OF TABLES

Table No.	Title	Page No.
1.	Distribution of patients who underwent in total hip arthroplasty according to sex	28
2.	Distribution of patients who underwent total hip arthroplasty according to age	29
3.	Distribution of patients who underwent total hip arthoplasty according to occupation	30
4.	Distribution of patients who underwent total hip arthroplasty according to laterality	32
5.	Distribution of patients who underwent total hip arthroplasty according to diagnosis	34
6.	Comparison of duration of stay in recovery are in patients who underwent total hip arthroplasty	36
7.	Comparison of VAS (at rest) in patients who underwent total hip arthroplasty in both groups	37
8.	Comparison of VAS (at dynamic mobilisation) in patients who underwent total hip arthroplasty in both groups	39
9.	Comparison of VAS (at dynamic mobilisation) in patients who underwent total hip arthroplasty in both groups	41
10.	Comparison of Time of first rescue analgesia (hours) in patients who underwent THA in both groups	42
11.	Comparison of Amount and Type of rescue analgesia given in patients who underwent THA in both groups at different durations.	43
12.	Comparison of Quadriceps muscle strength duration in patients who underwent THA in both groups	45
13.	Comparison of Weight-bearing in patients who	46

	underwent THA in both groups	
14.	Correlation between VAS score (at rest) and Rescue analgesia	47
15.	Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia)	50

LIST OF FIGURES

Fig. No.	Title	Page No.
1.	Distribution of patients who underwent in total hip arthroplasty according to Sex	28
2.	Majority of the patients were in the age group of 41 to 60 years of age.	29
3.	Distribution of patients who underwent total hip arthoplasty according to occupation	31
4a.	Distribution of patients according to laterality	32
4b.	Comparison of laterality with and without LIA	33
5a.	Distribution of patients who underwent total hip arthroplasty according to diagnosis	35
5b.	Distribution of patients who underwent total hip arthroplasty according to diagnosis	35
6.	Comparison of duration of stay in recovery in patients who underwent total hip arthroplasty	36
7.	Comparison of VAS (at rest) in patients who underwent total hip arthroplasty in both groups	38
8.	Comparison of VAS (at dynamic mobilisation) in patients who underwent THA in both groups (with LIA and without LIA)	40
9.	Comparison of VAS (at dynamic mobilisation) in patients who underwent total hip arthroplasty in both groups	41
10.	Comparison of Time of first rescue analgesia hours in patients who underwent THA in both groups	42
11.	Comparison of Amount and Type of rescue analgesia given in patients who underwent THA in both groups at different durations	44
12.	Comparison of Quadriceps muscle strength duration in patients who underwent THA in both groups	45
13.	Comparison of Weight-bearing in patients who	46

	underwent THA in both groups	
14a.	Correlation between VAS (at rest) score and Rescue analgesia at 0 mins	48
14b.	Correlation between VAS (at rest) score and Rescue analgesia at 6 hrs	48
14c.	Correlation between VAS (at rest) score and Rescue analgesia at 12 hrs	49
14d.	Correlation between VAS (at rest) score and Rescue analgesia at 24 hrs	49
15a.	Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 0 mins	50
15b.	Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 6hrs	51
15c.	Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 12hrs	51
15d.	Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 24hrs	52

LIST OF PICTURES

Pic. No.	Title	Page No.
1.	Drugs used in LIA cocktail	22
2.	Gluteal and adductor muscles	23
3.	Around rim of acetabulum focusing on joint capsule	23
4.	Iliotibial band	24
5.	External rotators, Gluteus tendon	24
6a.	Subcutaneous tissues	25
6b.	Subcutaneous tissues	25

BABA FARID UNIVERSITY OF HEALTH SCIENCES
Sadiq Road, Faridkot-151203 (Pb.) INDIA
Phone No. 91-1639-256253 and Fax No. 91-1639-256234
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INTRODUCTION

Surgery is one of the most painful procedures, with 41% of cases reporting moderate to severe post-operative pain. With the passage of time and advancements and researches in orthopaedics arthroplasty, hip arthroplasties (HA) have become common orthopaedic surgeries. Total hip arthroplasty (THA) is employed for a variety of judgments including Avascular necrosis of femur head, Osteoarthritis, Rheumatoid arthritis, proximal femoral and acetabular fractures in the senior, and fracture arthropathies. Historically, the posterior approach has been supported. In recent times, there has been discussion around newer approaches.[1] The term minimally invasive total hip arthroplasty has surfaced as a mask term for new surgical approaches and the use of smaller incisions. The direct anterior approach and the piriformis sparing approach have potential eventuality to reduce pain scores, ameliorate recovery, and ameliorate hip disability and osteoarthritis outgrowth scores (HOOS) as compared to the posterior approach.[2,3]

Surgical damage following HA involves a large, deep incision with considerable tissue dissection as well as exposure of muscle, bone, and vessels, which may lead to unsupportable postoperative pain.[2] Postoperative mortality after hip joint replacement is low, but a number of complications remain, including persistent post-surgical pain (PPSP), hip dislocation, infection and deep vein thrombosis.[4-7]

The pain intensity at rest generally decreases significantly. Still, pain can be aggravated by spasm of the femoral quadriceps during body movement, which may delay motor function recovery, reduce satisfaction, protract hospitalization, and eventually increase medical costs. Therefore, there is a need for comprehensive analgesic protocols that provide excellent pain relief both at rest and during movement, with minimal adverse events (AEs) and without affecting motor function.

Established postoperative analgesic styles for HA include epidural analgesia, spinal analgesia, intravenous case- controlled opioid analgesia, and supplemental whim-whams blocks. Epidural

analgesia is limited to 4 to 6 hours after HA and leads to numerous AEs, similar as hypotension, pruritus, and urinary retention, and detainments the inauguration of anticoagulant thromboprophylaxis.[2,8]

Spinal analgesia is generally used in the clinical setting of HA but also tend to be associated with numerous AEs, including headache, neurogenic bladder, hypotension, respiratory depression, pulmonary hypertension, cardiac complications, and threat for spinal infection. Although one meta- analysis has shown these postoperative styles to have several implicit advantages over general anaesthesia and there have been numerous advances to reduce similar complications, there's still the eventuality for unintentional dural perforation and neurologic injury, which may make these ways less respectable. On the other hand, supplemental whim-whams block including lumbar plexus or femoral and sciatic whim-whams blocks has come more popular in HA but is associated with specialized difficulties as well as the possibility of affecting quadriceps strength and adding the threat of falling.[2]

Consequently, original infiltration analgesia (LIA) was suggested as a fairly simple system for post-op pain relief. Original infiltration analgesia (LIA) with intra-operative administration of original anaesthetic in colourful combinations with epinephrine, non-steroidal anti-inflammatory medicines, opioids, steroids, or all to the crack is a simple, surgeon- administered fashion for the treatment of postoperative pain after hip (THA) and knee (TKA) arthroplasty.[9-11] The fashion may be supplemented by placement of a crack catheter intended to protract analgesia by infusion of original anaesthetic (and other anesthetics) to the crack in the postoperative period.[11,12]

The LIA fashion was firstly presented by Bianconi and associates, Kerr and Kohan and others, with promising primary results especially from a non-randomized experimental study in 325 cases demonstrating excellent pain control and discharge from sanitarium the day after surgery in 71 of cases. The fashion has gained wide use, although the optimal design of the LIA fashion (i.e. infiltration fashion,

medicine admixture, use of crack catheters, etc.) has not been fully evaluated.[13]

LIA involves high- volume intraoperative infiltration and intraarticular re-injections with a admixture of ropivacaine, ketorolac, and epinephrine. Intraoperative LIA with this admixture has been shown to give effective pain relief after TKA, but there are only limited data available on the analgesic effect after THA. Research has demonstrated that LIA is more efficient in managing postoperative pain following THA than placebo, epidural anesthesia[14], intravenous infusion of morphine[15], and morphine and ketorolac[16], but these studies had some methodological paucities and used different LIA ways and fusions of medicines, which makes interpretation of the results delicate.[11]

It isn't clear whether intra-articular postoperative top- up gelcap injections or nonstop infusion of anaesthetics through an indwelling catheter have any salutary effect in dragging analgesia after THA. Relatively large variations in postoperative pain intensities have been reported in former studies. Some authors have reported low pain intensities with an oral multimodal authority conforming of acetaminophen, non steroidal anti-inflammatory medicines (NSAIDs), and gabapentin, but others have reported high intensities of pain despite employing Analogous interventions.[17,18] Also, it's disputed whether NSAIDs have a specific original effect or whether the analgesic effect is achieved through immersion into the systemic rotation. Therefore, the optimal form of postoperative analgesia in THA is still being debated.[19,20]

Due to the variability in LIA, it is challenging to pin point the ‘utmost effective’ elements or factors. Therefore, farther studies are demanded to support standardization of LIA and its use along with combined spinal and epidural anaesthesia.

AIMS AND OBJECTIVES

AIM:

To compare functional outcome of patient being given combined spinal and epidural anesthesia with and without local infiltration of analgesia (LIA) in Total Hip Arthroplasty

Rationale :

To compare the efficacy and reliability of LIA in patients of total hip arthroplasty.

OBJECTIVES :

1. To assess patients post operative pain using VAS scoring.
2. To study the functional outcomes in these patients.
3. To evaluate efficacy and safety of local infiltration of analgesia (LIA) on post-operative pain management in patient undergoing total hip replacement.

REVIEW OF LITERATURE

THA stands out as a highly cost-effective and consistently successful procedure within orthopaedic surgery. It delivers reliable outcomes for individuals experiencing end-stage degenerative hip osteoarthritis, including significant pain relief, restoration of function, and enhancement of overall quality of life.

The primary indication for THA is typically end-stage hip osteoarthritis (OA) that is symptomatic. Moreover, conditions such as hip osteonecrosis (ON), congenital hip disorders like hip dysplasia, and inflammatory arthritic conditions are also frequently addressed through THA.[21,22]

Patient having hip degeneration are usually elderly with multiple co morbidities and experience varying intensity of pain necessitating the use of either parenteral or central neuraxial techniques like continuous epidural analgesia for postoperative pain relief.[23] Both these modalities are fraught with adverse side effects like drowsiness or motor block which may adversely affect dynamic pain relief and rehabilitation. Therefore, the need for effective postoperative pain control after hip surgeries has led to the development of numerous regional analgesic technique like local infiltration of anaesthesia, epidural injection, intrathecal morphine etc.

Implantation of prosthesis for total hip arthroplasty is often accompanied with severe inflammation resulting in high intensity of pain. Immediate reduction of this pain might be an important factor in early recovery process. Poor pain control may lead to major discomfort for the patient and also impaired early mobilization. Immobilization of the patient leads to increased time spent in bed which increases the probability of developing deep vein thrombosis and resulting prolonged hospital stay.[24]

Effective pain control can quicken the recovery time and decrease the length of hospitalization and enable patients to return home sooner.[11]

Initially recognized and conventional simple methods for post-operative (total hip arthroplasty) pain management is opioid administered intravenously either as intermittent boluses or as patient controlled analgesia infusion. However, large doses of opioids are often required which increases the risk of side effects, such as sedation, post-operative delirium, nausea, vomiting, respiratory depression.

Epidural analgesia (EA) was being widely used for post operative pain management following total hip arthroplasty. Epidural anaesthesia with an indwelling catheter prolongs pain relief, but can lead to serious and rare complications such as epidural hematoma, nerve damage, catheter displacement or epidural infection.

LIA

Local analgesia (LIA) refers to the administration of both high-volume local anaesthetics (LA) and systemic peri-articular injections of NSAIDs for managing pain, showing varying degrees of effectiveness. Administering NSAIDs orally or systemically during orthopaedic surgery has been controversial due to concerns about their potential to inhibit osteoclast and osteoblast formation, which could lead to delayed healing.[25,11]

History

Local infiltration analgesia was pioneered by Kerr and Kohan in Australia in 2008. This technique utilizes a combination of an anaesthetic drug and a NSAID, with the optional addition of adrenaline or corticosteroids.[26]

A study done by Sandri M et al. (2020) evaluated the effectiveness of combining perivascular nerve block with LIA as the only anaesthesia technique for THA.[27]

McCarthy et al. conducted a randomized controlled trail and revealed that LIA conferred superior analgesia to intrathecal morphine following THA in patients.[28]

According to Casati and Putzu, ropivacaine and levobupivacaine were developed as alternatives to bupivacaine to mitigate the risk of severe toxicity associated with bupivacaine use.[29]

Saeid Safari's study demonstrated that adding ketorolac to ropivacaine and epinephrine via the LIA technique effectively lowered postoperative pain scores and reduced the requirement for opioids. The addition of epinephrine helps reduce the toxicity of local anaesthetics by constricting blood vessels at the injection site, thereby limiting the systemic absorption of the anaesthetic and keeping it localized to the area of injection.[30]

LIA is a straight-forward technique administered by surgeons for pain management following THA and total knee arthroplasty (TKA). This method has been noted to offer effective pain relief with minimal adverse events. There have been several randomized controlled trials (RCTs) that compared the effectiveness of LIA with intrathecal morphine or epidural analgesia in patients after THA and TKA. However, their results remained controversial. Andersen et al.[11] compared the efficacy of epidural analgesia with intraoperative periarticular injection (including ropivacaine, ketorolac, and epinephrine) plus intraarticular infusion (including ropivacaine and ketorolac). They draw the inference that the latter technique provided better pain relief and less morphine utilization than the former treatment.

There is no universally accepted standard protocol for LIA. In brief, it typically includes a combination of a local anaesthetic, a NSAID, and adrenaline. Some authors have supplemented this mixture with morphine and/or steroids. Most studies employ ropivacaine as the local anaesthetic, although bupivacaine has also been used in some cases.[11]

Ropivacaine and levobupivacaine have slightly lower anaesthetic potency compared to bupivacaine. However, they demonstrate reduced central nervous system and cardiovascular toxicity. There is a growing preference for using ropivacaine or levobupivacaine in LIA, rather than bupivacaine.[31]

Due to the variability in LIA techniques, pin pointing the single ‘most effective’ component or combination of components is challenging. Thus, further studies are needed to support

standardization of LIA and its use along with combined spinal and epidural anaesthesia.

Dennis R Kerr et al. in 2008 published a case study of 325 cases on original infiltration analgesia has emerged as a trend for managing acute postoperative pain after knee and hip surgery. In their open, nonrandomized case series, the authors employed LIA to manage postoperative pain in all 325 cases presented to their service from January 1, 2005, to December 31, 2006 for optional hip resurfacing (HRA), primary total hip relief (THR), or primary total knee relief arthroplasty (TKR). Authors recorded pain scores, rallying times, and morphine operation for the entire group. Results showed that pain control was generally satisfactory (numerical standing scale pain score range 0 – 3). No morphine was needed for postoperative pain control in two- thirds of the cases. Utmost cases were suitable to walk with backing between 5 and 6 h after surgery and independent mobility was achieved 13 – 22 h after surgery. Orthostatic hypotension, nausea, and puking were sometimes associated with standing for the first time, but other side goods were normal. 230(71%) of the 325 cases were discharged directly home after a single late stay in sanitarium. Original infiltration analgesia is simple, practical, safe, and effective for postoperative pain after knee and hip surgery.[26]

Zhang S et al. in 2011 conducted a randomized, double-blind, placebo- controlled study on the effect of single- injection versus continuous infusion infiltration analgesia following TKA. In this randomized, double-eyeless, placebo- controlled, single- centre study, 80 cases (American Society of Anaesthesiologists physical status I – III) entered postoperative single- injection original infiltration analgesia (SLIA), nonstop original infiltration analgesia (CLIA) or placebo (control group). Intravenous case- controlled morphine was used as deliverance analgesia. The CLIA group showed lower postoperative visual Analogue scale (VAS) pain scores from 8 to 48 h at rest and from 16 to 48 h during exertion compared with the SLIA group. The subjects with CLIA consume notably low morphine compare to SLIA group. Case satisfaction was improved, and maximum knee flexion on

postoperative days 7 and 90 was lower in the CLIA group compared to the SLIA group. CLIA handed dragged superior analgesia and was associated with further favourable functional recovery and case satisfaction compared with SLIA.[32]

Denise McCarthy et al. in 2012 conducted a methodical review on original infiltration analgesia for postoperative pain control following THA. The main objective of this paper was to assess whether local infiltration analgesia (LIA) is superior to no intervention, placebo, and standard analgesic methods in patients undergoing total hip arthroplasty, focusing on specific outcome measures. These outcomes include postoperative pain scores, overall function and recovery, and hospital length of stay. Secondary objectives included reviewing existing evidence and current understanding of the pharmacokinetics of local anaesthetics and adjuvant medications used in LIA, as well as evaluating the incidence of adverse events associated with this approach.[28]

Fowler SJ et al. in 2013 conducted a study on high volume original infiltration analgesia compared to supplemental whim-whams block for hip and knee arthroplasty — what's the substantiation? Authors shouldered this review to probe whether there was substantiation for parity of HVLIA compared to supplemental whim-whams block ways with respect to early postoperative analgesia and functional recovery, or for other issues similar as cost and process effectiveness, patient postsurgical pain and arthroplasty modification rate. They found that despite the popularity of high-volume local infiltration analgesia (HVLIA), there is currently limited supporting evidence for its use. HVLIA effectively provides postoperative pain relief, but it is uncertain whether it is superior to contemporary nerve block techniques in terms of pain management or overall functional recovery within a modern, comprehensive enhanced recovery program. The advantages of HVLIA in terms of managing post-surgical pain, improving cost-effectiveness, and enhancing procedural efficiency are still uncertain. Well-designed trials that directly compare nerve block techniques with standardized HVLIA protocols are urgently needed.[33]

Kuchalik J et al. in 2013 conducted a randomized, double-eyeless comparison between intrathecal morphine and original infiltration analgesia on postoperative pain relief after total hip arthroplasty. Eighty cases were signed in this randomized, double-eyeless study. ITM 0.1 mg (Group ITM) or periarticular original anaesthetic (ropivacaine 300 mg) ketorolac 30 mg epinephrine 0.5 mg(total volume151.5 ml)(Group LIA) were compared and postoperative 24 hrs, 22ml of saline or 150 mg ropivacaine with 0.1 mg epinephrine were delivered via catheter. After the operation, the researchers assessed analgesic consumption, pain intensity levels, and readiness to return home. Results showed that morphine consumption was original, median difference 0 mg (95 confidence interval -4 to 4.5) between the groups at 0 – 24 h. During 24 – 48 h, it was lower in Group LIA (3 mg, 0 – 60 mg, standard, range) compared with Group ITM (10 mg, 0 – 81 mg)(P=0.01). Lower pain scores were recorded at rest at 8 h in Group ITM (P<0.01), but in Group LIA on standing and rallying, at 24 – 48 h(P<0.01). Paracetamol and tramadol consumption was lower in Group LIA (P=0.05 and 0.05, independently) as was pruritus, nausea, and puking (P<0.05). The authors concluded that although lower pain intensity was initially observed after surgery in the ITM group, patients receiving LIA had lower analgesic consumption, lower pain intensity during movement and recovery, and fewer side effects later on. Therefore, LIA is considered a preferable option to intrathecal morphine for patients undergoing THA.[34]

Yin JB et al. in 2014 conducted a systematic review and meta-analysis on original infiltration analgesia for postoperative pain management following hip arthroplasty. Data from 9 randomized controlled trials, involving 760 actors, comparing the effect of LIA with that of placebo infiltration or no infiltration on cases witnessing HA were recaptured from an electronic database, and the pain scores, analgesic consumption, and AEs were anatomized. Goods were epitomized using weighted mean differences, formalized mean differences, or odds rate with fixed or arbitrary effect models. There was strong substantiation of an association between LIA and reduced pain scores

at 4 hours at rest (P<.00001) and with stir (P<.00001), 6 hours with stir (P =0.02), and 24 hours at rest (P =0.01), and dropped analgesic consumption during 0 to 24 hours (P =.001) after HA. These analgesic effectualness for LIA weren't accompanied by any increased threat for AEs. Still, the current meta- analysis didn't reveal any associations between LIA and the reduced pain scores or analgesic consumption at other time points. The results suggest that LIA can be used for controlling pain after HA because of its efficacity in reducing pain scores and therefore can reduce analgesic consumption on the first day without increased threat of AEs. This is the first pooled database meta- analysis to evaluate the analgesic effects and safety of LIA in controlling pain after HA. The deduced information offers direct substantiation that LIA can be used for cases witnessing HA because of its capability to reduce pain scores and analgesic consumption without any fresh AEs.[35]

Andersen LØ et al. in 2014 conducted a methodical review on analgesic efficacity of original infiltration analgesia in hip and knee arthroplasty. In THA, no fresh analgesic effect of LIA compared with placebo was reported in trials with low threat of bias when a multimodal analgesic authority was administered perioperatively. Compared to intrathecal morphine and epidural analgesia, LIA was reported to have analogous or advanced analgesic efficacity and in the utmost trails there is reduced in pain an there is reduction of opioid use with local injection compare to control group during the TKA. Compared with femoral whim-whams block, epidural or ITM, LIA handed analogous or advanced analgesia in the initial postoperative period but utmost trials had a high threat of bias due to different systemic analgesia between groups. Overall, the use of crack catheters for postoperative administration of original anaesthetic wasn't supported in the included trials, and LOS wasn't related to analgesic efficacity. Despite the numerous studies of LIA, final interpretation is hindered by methodological paucities in utmost studies, especially because of differences in use of systemic analgesia between groups. Still, LIA provides effective analgesia in the original postoperative period after

TKA in utmost randomized clinical trials indeed when combined with multimodal systemic analgesia. In discrepancy, LIA may have limited fresh analgesic efficacity in THA when combined with a multimodal analgesic authority. Postoperative administration of original anaesthetic in crack catheters didn't give fresh analgesia when systemic analgesia was analogous and LOS wasn't related to use of LIA with a fast- track set- up.[11]

Marques EM et al. in 2014 conducted a methodical review and meta- analyses of short- and long- term effectiveness on original anaesthetic infiltration for peri-operative pain control following THA and TKA. Authors performed a methodical review of randomised controlled trials of original anaesthetic infiltration in cases entering THR or TKR. Authors searched MEDLINE, Embase and Cochrane CENTRAL to December 2012. Two pundits screened objectifications, uprooted data, and communicated authors for unpublished issues and data. issues collected were post-operative pain at rest and during exertion after 24 and 48 hours, opioid demand, mobilisation, sanitarium stay and complications. When doable, they estimated pooled treatment goods using arbitrary goods meta- analyses. Results showed that in 13 studies including 909 cases witnessing THR, cases entering original anaesthetic infiltration endured a lesser reduction in pain at 24 hours at rest by standardised mean difference (SMD)−0.61(95 CI−1.05,−0.16; p = 0.008) and by SMD−0.43(95 CI−0.78−0.09; p = 0.014) at 48 hours during exertion. In TKR, different multi-modal rules were reported. In 23 studies including 1439 cases witnessing TKR, original anaesthetic infiltration reduced pain on average by SMD−0.40(95 CI−0.58,−0.22; p<0.001) at 24 hours at rest and by SMD−0.27(95 CI−0.50,−0.05; p = 0.018) at 48 hours during exertion, compared with cases entering no infiltration or placebo. There was substantiation of a larger reduction in studies delivering fresh original anaesthetic after crack check. There was no substantiation of pain control fresh to that handed by femoral whim-whams block. Cases entering original anaesthetic infiltration spent on average an estimated0.83 (95 percent CI 1.54,0.12; p = 0.022) and0.87(95 percent CI 1.62,0.11; p = 0.025) smaller days in

sanitarium after THR and TKR independently, had reduced opioid consumption, before mobilisation, and lower prevalence of puking. Many studies reported long- term issues. Authors concluded that original anaesthetic infiltration is effective in reducing short- term pain and sanitarium stay in cases entering THR and TKR. This study helps us to know whether giving local anaesthesia can help in controlling pain for longer time. Enhanced pain control with fresh analgesia through a catheter should be counted against a possible infection threat.[36]

Kuchálika J et al. in 2017 conducted a randomized, double-eyeless study on original infiltration analgesia or femoral whim-whams block for postoperative pain operation in cases witnessing THA. In this randomized, double-eyeless study, 56 cases (ASA I- III) witnessing THA acceded to share. In Group FNB, cases entered an ultrasound-guided femoral whim-whams block using 30 ml of ropivacaine7.5 mg/ ml (225 mg) while Group LIA entered a analogous volume of saline. Spinal anaesthesia was also performed and bupivacaine heavy, 3 –3.5 ml fitted depending on patient characteristics. During surgery, cases in Group LIA entered a admixture of 300 mg (150 ml) ropivacaine, ketorolac 30 mg (1 ml) and adrenaline 0.5 mg (0.5 ml) (total volume 151.5 ml) peri-articularly and subcutaneously while Group FNB entered 151.5 ml of saline peri-articularly in a methodical way by the surgeon. A multi-hole catheter was placed with the tip placed intra-articularly at the end of surgery in both groups. After 23 h, the LIA admixture conforming of 20 ml ropivacaine (7.5 mg/ ml), ketorolac 30 mg (1 ml), adrenaline 0.1 mg (1 ml) (total volume 22 ml) was fitted in Group LIA and the same volume of saline in Group FNB. Post- operative pain, analgesic consumption (postoperative and post-discharge), side goods, home discharge, quality of life and hip function were recorded, the ultimate up to 6 months after surgery. Results showed that postoperative pain intensity was significantly lower in Group LIA compared to Group FNB during rallying at 24 h(primary end point), mean difference 1.8 NRS units(95 percent CI 0.7 –2.9)(P = 0.006), at rest after 4 h(P = 0.029) and on standing after 24(P = 0.0003) and 48 h(P = 0.043). Deliverance

morphine consumption was also significantly lower in Group LIA during 0 – 24, mean difference 13.5 mg (95 percent CI, 6.1 –20.9) (P = 0.002) postoperatively. Motor block was lesser at 6 h (P = 0.029) postoperatively in Group FNB. Two cases (one in each group) had patient post-surgical pain (NRS> 3) at 3 months (3.6) but none at 6 month. No other differences were set up between the groups.[37]

Kuchálik J et al. in 2017 conducted a study on original infiltration analgesia a 2 - time follow - up of cases witnessing THA. The study was a secondary analysis of data from a former larger study. Eighty cases were randomized to admit either intrathecal morphine (Group ITM) or original infiltration analgesia (Group LIA) for pain operation in a double-eyeless study. The parameters measured were patient- assessed functional outgrowth (using the hip dysfunction and Osteo- arthritis outgrowth Score (HOOS) questionnaire), health- related quality of life (using the European Quality of Life – 5 confines (EQ- 5D) questionnaire and the 36- Item Short Form Health Survey (SF- 36) score), and pain using the numeric standing score (NRS), with patient post-surgical pain having a NRS of> 3 or a HOOS pain sub-score of> 30. All complications and adverse events were delved during the first 2 times after primary surgery. Results showed that pain intensity and deliverance analgesic consumption were analogous between the groups after sanitarium discharge. No differences were set up in HOOS or SF- 36 score between the groups up to 6 months after surgery. A significant group × time commerce was seen in the EQ 5D form in favor of the LIA group. No between- group difference in patient post-surgical pain was set up at 3 or 6 months, or in adverse events up to 2 times after surgery. Authors concluded that analysis of functional outgrowth, quality of life, and post-discharge surgical pain didn't reveal significant differences between cases entering LIA and those entering ITM. LIA was set up to be a safe fashion for THA during the long- term follow-up. Still, it should be noted that these conclusions are grounded on a limited number of cases.[38]

Berninger MT et al. in 2018 conducted a study was conducted to evaluate the effects of periarticular infiltration analgesia (LIA), nerve

blocks, general anaesthesia (GA), and spinal anaesthesia (SP) on early functional recovery and pain control in patients undergoing uni-compartmental knee arthroplasty (UKA). Between January 2016 and August 2016, 134 patients who underwent primary UKA were divided into four groups: GA with femoral and sciatic nerve blocks (GA & FNB), SP with epidural catheter (SP & EPI), GA with LIA (GA and LIA), and SP with LIA (SP and LIA). Outcome measures focused on pain evaluation using Numerical Rating Scale (NRS) scores, recovery, muscle strength, and range of motion up to 7 days postoperatively. The amount of rescue pain medication administered was also analysed. Results showed that on the day of surgery, the LIA groups had significantly lower mean NRS scores at rest compared to the catheter-based groups (GA & FNB and SP & EPI). In the early postoperative period, the use of hydromorphone as rescue pain medication was significantly lower in the SP & EPI group compared to all other groups, with reductions of up to 68%. There were no significant differences observed in terms of recovery, muscle strength, or range of motion among the groups, although there appeared to be a trend toward improved recovery and muscle strength with GA and LIA. Generally, GA tended to enhance recovery outcomes. The authors concluded that apart from lower NRS scores at rest on the day of surgery in the LIA groups, pain relief was comparable across all groups without clinically significant differences. However, the use of opioids was significantly lower in the SP&EPI group. They suggested that while LIA did not show a clear clinically significant advantage in UKA, it remains a safe and effective treatment option comparable to established conventional procedures.[39]

YY Fang et al. in 2019 conducted a study on original infiltration analgesia in primary TKA. This single- centre retrospective cohort study signed cases with knee osteoarthritis who were listed for primary TKA during the period from January 2017 to December 2017. Cases with habitual seditious common complaint, contra- suggestions for LIA, or madness were barred. Cases in the LIA group were administered single- cure LIA intra-operatively, while those in the control group were

not. Primary issues were postoperative pain score, morphine demand, and morphine consumption; secondary issues were range of stir, quadriceps power, and postoperative length of stay. Results showed that in aggregate, 136 cases were signed (68 per group). Total postoperative morphine demand and consumption, as well as pain scores from postoperative day (cover) 1 to cover 4, were lower in the LIA group than in the control group. The range of stir from cover 1 to cover 4 and quadriceps power on cover 1 were advanced in the LIA group than in the control group. Quadriceps power from cover 2 to cover 4 and postoperative length of stay weren't significantly different between groups. Authors concluded that intra-operative single- cure LIA can effectively reduce postoperative pain, morphine demand, and morphine consumption. thus, the use of LIA is recommended during TKA.[40]

Xiao-Qiang Peng et al. in 2020 conducted a meta- analysis of randomized controlled trial on the efficacy and safety of periarticular infiltration analgesia for pain management in total knee and hip arthroplasty through a systematic review. A comprehensive literature search was conducted in PubMed, Embase, and Web of Science databases up to February 21, 2019. Key outcomes assessed included pain intensity measured by visual Analogue scale, morphine consumption, length of hospital stay, and occurrence of adverse events. Data were analyzed using weighted mean difference (WMD) or risk ratio (RR) with 95% confidence intervals (95% CIs). The meta-analysis included eleven studies comprising a total of 707 patients that met the inclusion criteria. LIA handed better pain control than other 2 ways at 24- hour(WMD=16.0, 95% CI: 8.87–23.13; P<.001), and 72-hour (WMD=11.31, 95% CI: 3.78–18.83; P<.001). Furthermore, LIA demonstrated comparable morphine consumption and hospital stay duration to intrathecal morphine and epidural analgesia. Importantly, LIA exhibited a significantly lower incidence of adverse events compared to these other two techniques. Based on these findings, the authors concluded that LIA offers superior postoperative pain

management and fewer adverse events than intrathecal morphine and epidural analgesia following THA and TKA (4).[41]

Kopitkó C et al. in 2021 conducted a randomized relative evaluation of original infiltration analgesia, extended whim-whams blocks, and conventional analgesia in pain operation after TKA. Between 24th February 2020 and 10th July 2020, a aggregate of 161 cases (55 males, 106 ladies; median age69.0 times(IQR63.0-75.0), range, 41 to 81 times) who passed primary TKA were aimlessly allocated into three resemblant groups according to their attendant procedure in a double-eyeless fashion(i) those to whom whim-whams leaguer was performed after competition of surgery under the duration of spinal anesthesia(n = 50);(ii) those to whom LIA was performed during surgery(n = 52), and(iii) control group(n = 59). The content of LIA was 10- 10 mL of 20 mg lidocaine with0.01 mg adrenalin and 100 mg ropivacaine, 1 mL(30 mg) ketorolac, and 5 mL(500 mg) tranexamic acid was adulterated by 50 mL 0.9 NaCl under aseptic conditions. Outgrowth parameters were the evaluation of pain until the evening of first postoperative day (24 to 36 h), rallying, and blood loss within the first three postoperative days. Results indicated that postoperative pain was minimal between 4 and 8 hours after surgery, coinciding with the waning effect of spinal anaesthetic medications. During this crucial period, a Numerical Rating Scale (NRS) score of 3 or less, indicating tolerable pain levels, was observed in 52, 42, and 19 of whim-whams leaguer in LIA and control groups, independently. None of the patients in the LIA group reported experiencing high-intensity pain (NRS > 8), which was a significant difference compared to the nerve block and control groups (10% and 14%).[42]

Alexey Vladimirovich Lychagin et al. in 2022 conducted a study on postoperative pain control by original infiltration analgesia and supplemental whim-whams block in primary prosthetic total knee arthroplasty. Authors estimated three groups of cases treated with primary total knee arthroplasty (TKA) due to characteristic end- stage osteoarthritis with post-op pain control by LIA (LIA group, n = 52), femoral plus sciatic whim-whams block (FSNB) (FSNB group, n = 54),

and without original or indigenous analgesia as controls (Control group, n = 53). The primary outgrowth variable was the post-op pain position measured by the Knee Society Score (KSS) and the quadriceps muscle strength recovery profile. Results showed that over to 4 hours post-op, pain intensity was significantly lower in FSNB cases (P 0.05). The KSS score showed analogous significant enhancement of functional capacities (P<0.05). Quadriceps muscle recovery profile was analogous in the LIA and Control groups, but significantly poorer in the FSNB group (P 7), an advanced body mass indicator, habitual obstructive pulmonary complaint, immunodeficiency runs, antedating pain runs, supplemental vascular complaint, anxiety and mood diseases, and substance abuse diseases. Liposomal bupivacaine reduces postoperative opioid use, case- reported issues, length of stay, and time to ambulation, yet is more precious than traditional bupivacaine. Researchers concluded that liposomal bupivacaine represents a useful adjunct for multimodal pain strategies in total hip arthroplasty with sufficient substantiation to suggest that it may be useful in dwindling postoperative opioid use. The high costs of LB represent a hedge to institutional acceptance of LB into standardized multimodal pain strategies. Farther sweats should be aimed toward better understanding the current state of integration of LB into academic and private practice settings, assiduity movements to drop the cost, and the part other spare measures may have in reducing post-operative opioid use.[43]

Vij et al. in 2022 conducted a scoping review on the role for HVLIA with liposomal bupivacaine in total hip arthroplasty. This IRB-exempt scoping review adhered strictly to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist. The literature search was performed in Mendeley. Search fields were varied until redundant. All articles underwent initial screening based on their titles and abstracts, with a preliminary decision made regarding inclusion. Full-text screening was then conducted on selected articles. Any uncertainties regarding article inclusion were resolved through discussion among

three authors until consensus was reached. In total, 21 articles were included for a qualitative description of the opioid epidemic and opioid overuse in total hip arthroplasty. Nine articles were included in the study concerning the utilization of liposomal bupivacaine in total hip arthroplasty. Multiple risk factors have been recognized for opioid overuse after total hip arthroplasty. These incorporate younger age, an opioid risk tool score of greater than 7, a higher body mass index, chronic obstructive pulmonary disease, immuno-deficiency syndromes, pre-existing pain syndromes, peripheral vascular disease (PVD), anxiety and mood disorders, and substance abuse disorders. Liposomal bupivacaine reduces postoperative opioid use, patient-reported outcomes, length of stay, and time to ambulation, yet is more expensive than traditional bupivacaine. Researchers concluded that liposomal bupivacaine is a valuable addition to multimodal pain management strategies in total hip arthroplasty, supported by sufficient evidence indicating its effectiveness in reducing postoperative opioid consumption. The high costs of liposomal bupivacaine (LB) pose a barrier to its adoption in standardized multimodal pain management strategies within institutions. Furth er efforts should be directed towards gaining a deeper understanding of how liposomal bupivacaine (LB) is currently integrated into academic and private practice settings. Additionally, initiatives within the industry to reduce the cost of LB should be explored. Furthermore, research should investigate the potential roles of other adjunctive measures in effectively reducing post-operative opioid use.[44]

Biesemans et al. (2024) conducted a randomized, double-blind, placebo-controlled trial to evaluate the effectiveness of LIA on recovery following THA using the direct anterior approach under spinal anesthesia. Authors performed a randomized, double-eyeless, placebo- controlled trial aimed at examining the effectiveness of LIA in THA. A aggregate of 90 cases were included for statistical analysis. Their primary endpoint was the Visual Analogue Scale, VAS, (0 no pain, 10 unsupportable pain) preoperatively, at the 1st, 2nd, 3rd, 4th and 12th hour postoperative intervals and at discharge. Their

secondary endpoints included postoperative opioid consumption and patient satisfaction at 2 and 6 weeks post-operatively, assessed using the NRS. LIA demonstrated a tendency for better outcomes in terms of Visual Analogue Scale (VAS) scores at 3 and 4 hours post-operatively. There were no notable statistical distinctions observed in terms of cases challenging deliverance opioid consumption. Case satisfaction using the NRS at both the 2- week and 6- week postoperatively didn't differ significantly between both groups. The administration of LIA could offer advantages during the original stages of postoperative recovery, which could be particularly precious in rapid-fire recovery programs.[45]

Khan MJ et al. in 2024 conducted a study on adductor conduit block versus original infiltration analgesia for postoperative pain management after TKA. This prospective randomized relative study included 60 cases witnessing TKA for knee osteoarthritis under subarachnoid block (spinal anaesthesia). Cases were divided into two groups LIA group (original crack infiltration with periarticular injection of bupivacaine0.125 dexmedetomidine 1 mcg/ kg) and ACB group (ACB with bupivacaine0.125 1 mcg/ kg dexmedetomidine). Pain relief was assessed using the Numerical Rating Scale (NRS) score, time to first deliver analgesic demand (NRS> 3), and total quantum of analgesic demanded in the first 24 hours post-surgery. The results indicated that the time to first perception of pain with an NRS score greater than 3 was 11.30 ± 0.8 hours in the ACB group and 9.40 ± 1.1 hours in the LIA group, with a statistically significant difference ($p<0.001$). Also, the total number of deliverance analgesic boluses given in the first 24 hours post-operatively differed significantly between the two groups ($p = 0.046$). Researchers concluded that the study concludes that ACB is an effective postoperative analgesic modality, superior to original infiltration analgesia, for cases witnessing TKA.[46]

MATERIALS AND METHODS

Study design: Prospective

Study participants: Patients planned for total hip arthroplasty (THA) admitted in department of Orthopedics, Dayanand Medical College & Hospital, Ludhiana from September 2022 to September 2023 who had given valid informed consent to take part in the study.

Sample population : 47 patients

Study duration : One year (September 2022 to September 2023)

Study setting : Dayanand Medical College & Hospital, Ludhiana

Statistical analysis : Data will be described in terms of range; mean ± standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. To determine whether the data is normally distributed, a Kolmogorov-Smirnov test will be used. Comparison of quantitative variables between the study groups will be done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test will be performed and fisher exact test was used when the expected frequency is less than 5. A probability value (p-value < 0.05 will be considered statistically significant. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

INCLUSION CRITERIA

1. Patient scheduled for total hip replacement surgeries under combined spinal and epidural anesthesia and receiving local infiltration of anesthesia intraoperatively.
2. Cognitive ability to comprehend the VAS scale.

EXCLUSION CRITERIA

1. Allergy to local anesthetic drugs.
2. Use of opioids for chronic analgesia.
3. Patient of revision THR

STUDY GROUPS:

Around 47 patients were recruited for the study in the given time period and were divided into 2 groups :

GROUP 1 : 20 patients - Received local infiltration of anesthesia along with combined spinal and epidural anesthesia.

GROUP 2 : 27 patients - Who did not receive local infiltration of anesthesia along with combined spinal and epidural anesthesia.

- The local infiltration of anaesthesia consists of inj ropivacaine, adrenaline, ketorolac and fentanyl.
- Drugs used in LIA cocktail

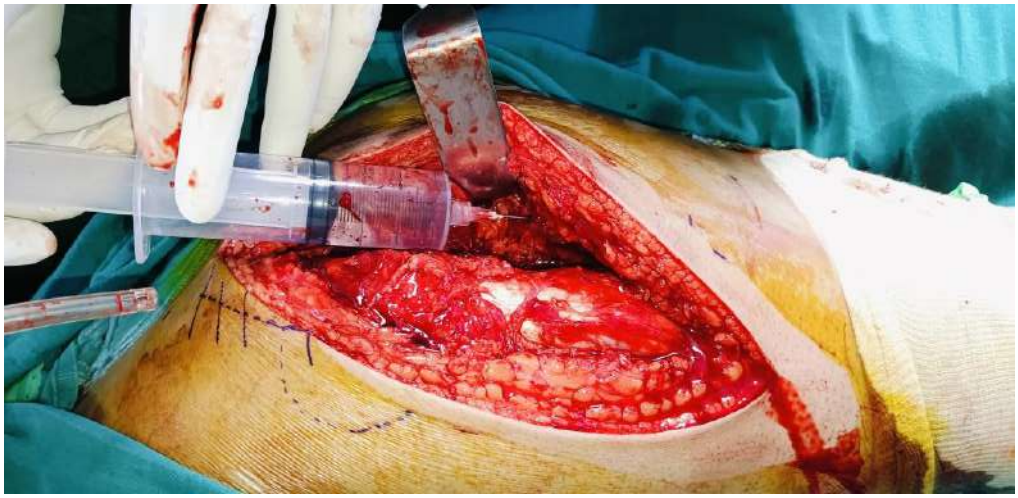
MEDICATION	STRENGTH/DOSE	AMOUNT
Ropivacaine	2%	50ml
Adrenaline	1mg/1ml	1ml
Ketorolac	30mg/1ml	1ml
Fentanyl	50mcg/1ml	2ml

Picture 1: Drugs used in LIA cocktail

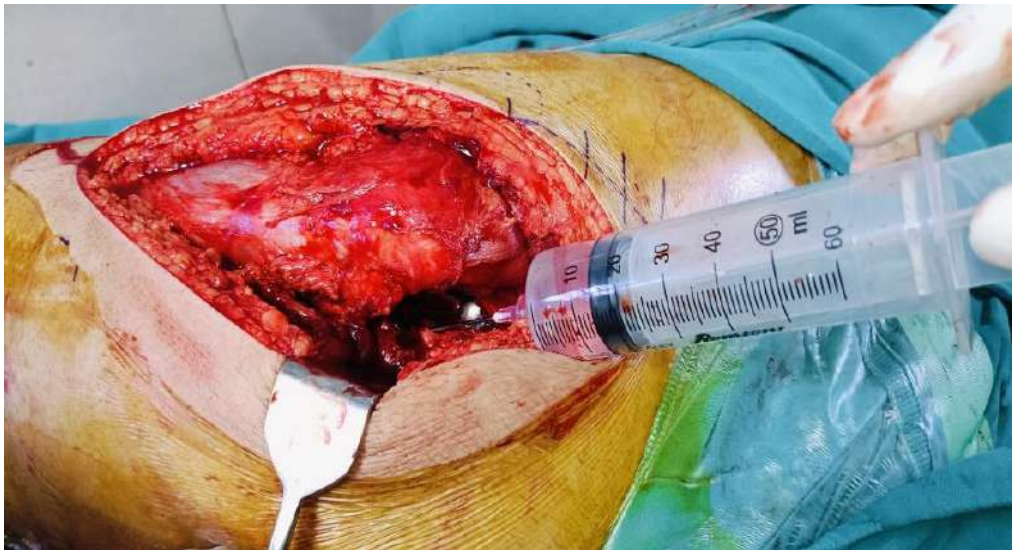
- The LIA was Injected in three areas:

1) The tissues around rim of acetabulum focusing on joint capsule and around exposed gluteal and abductor muscles (Picture 2 and 3)
2) External rotators, gluteus tendon, iliotibial band (Picture 4 & 5)
3) Subcutaneous tissues under the wound (Picture 6a & 6b)

Picture 2: Gluteal and Adductor muscles



Picture 3: Around rim of acetabulum focusing on joint capsule



Picture 4: Iliotibial band

Picture 5: External rotators, Gluteus tendon

Picture 6a: Subcutaneous tissues

Fig 6b: Subcutaneous tissues

POSTOPERATIVE ASSESSMENT:

PRIMARY OUTCOME:-

1. Assessment of postoperative pain in patients using Visual Analogue Scale (VAS) scoring

   VAS measured as rest and at dynamic mobilisation at 0 minutes, then 6hourly, 12 hourly and 24hourly

   Dynamic hip movement was assessed by instructing patients to abduct and adduct their legs.

   The pain score was determined by asking the patient to rate their pain on a scale from 0 to 10, where 0 represents no pain and 10 represents maximum pain.[47]

2. FUNCTIONAL MOBILITY was evaluated by:

   QUADRICEPS MUSCLE STRENGTH: The most commonly accepted method for evaluating quadriceps muscle strength is the Oxford Scale, also known as the Medical Research Council Manual Muscle Testing (MMT) scale. This scale assesses quadriceps strength against resistance and gravity, grading the patient's strength on a scale from 0 to 5 at 24 and 48 hours postoperatively.

Grade 0- Complete inability to contract the muscle

Grade 1- Only a slight contraction or flicker of muscle

Grade 2- Movement of leg through its complete range of motion, but only in a horizontal plane, Not resisting the force of gravity

Grade 3- Able to hold leg up off the table against the pull of gravity, but not able to withstand any additional pressure

Grade 4-Capable of actively lifting the leg against gravity and with some resistance

Grade 5-Actively maintaining the leg against gravity and significant resistance [48]

3. WEIGHT-BEARING:

After THA, it is of utmost importance for recovery to get the right amount of weight-bearing when moving around using walkers.

We have accessed the patient ability to bear max weight at 24hrs and 48 hrs after the procedure.

Weight Bearing Grades:

- Non-weight bearing means that the leg should not bear any weight or touch the floor for support. The patient typically uses crutches to assist in mobility while keeping the affected leg completely off the ground.
- With touch-down weight-bearing, the toes of the foot can touch the floor solely to maintain balance. At no point should the individual place weight on the leg.
- With partial weight-bearing, the patient is allowed to place a limited amount of weight on the affected extremity. This weight-bearing allowance gradually increases over time, enabling the patient to ambulate with the assistance of an ambulatory device such as a cane or crutches.
- With weight-bearing as tolerated, the individual may support 50% to 100% of body weight on the extremity. The amount of weight-bearing allowed depends on the specific circumstances and the recommendations provided by the healthcare provider
- With full weight-bearing, the affected leg is capable of bearing the entire weight of the body and supporting normal ambulation.[49]

SECONDARY OUTCOME:-

1. The total analgesic drug requirement in first 24 hours was compared for both the groups.
2. The time for need of first rescue analgesia was compared in both the groups.

Injection Tramadol of strength 50-100mg i/v (intra-venous) was used as rescue analgesic to a maximum of 400mg within 24 hours.

OBSERVATIONS AND RESULTS

Our study was conducted on 47 patients who came to us for total hip arthroplasty.

GENDER

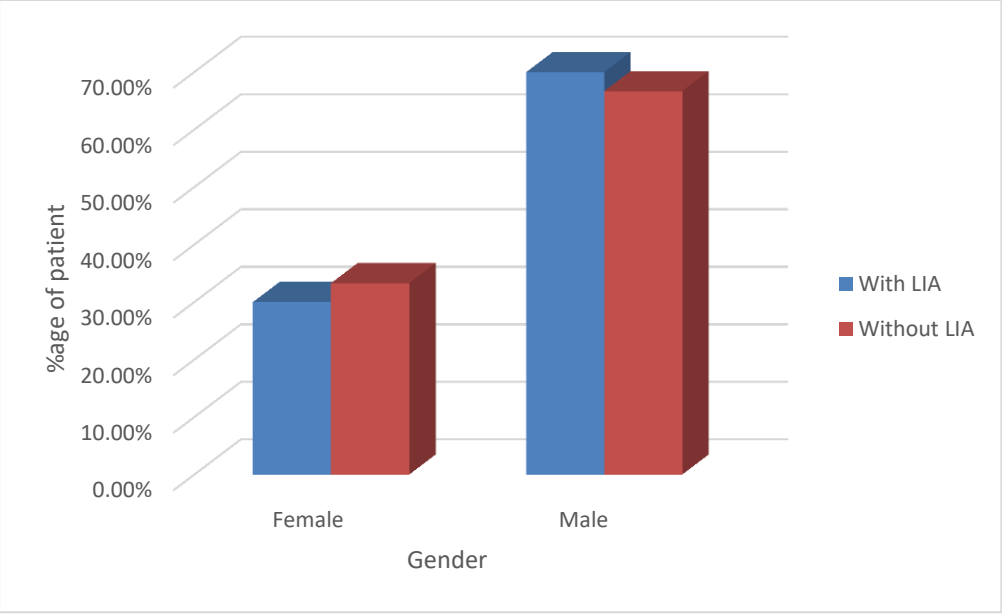
Out of 47 patients there were 32 male and 15 female patients.

Table 1: Distribution of patients who underwent in total hip arthroplasty according to sex

	With LIA		Without LIA		Total		chi sqaure	p-value
	n	%	n	%	n	%		
Female	6	30.0%	9	33.3%	15	31.9%	0.059	0.808
Male	14	70.0%	18	66.7%	32	68.1%		
Total	20	100.0%	27	100.0%	47	100.0%		

The chi-square test results in a value of 0.059 with a p-value of 0.808, indicating no statistically significant difference in gender distribution between the groups with and without LIA.

Figure 1: Distribution of patients who underwent in total hip arthroplasty according to Sex



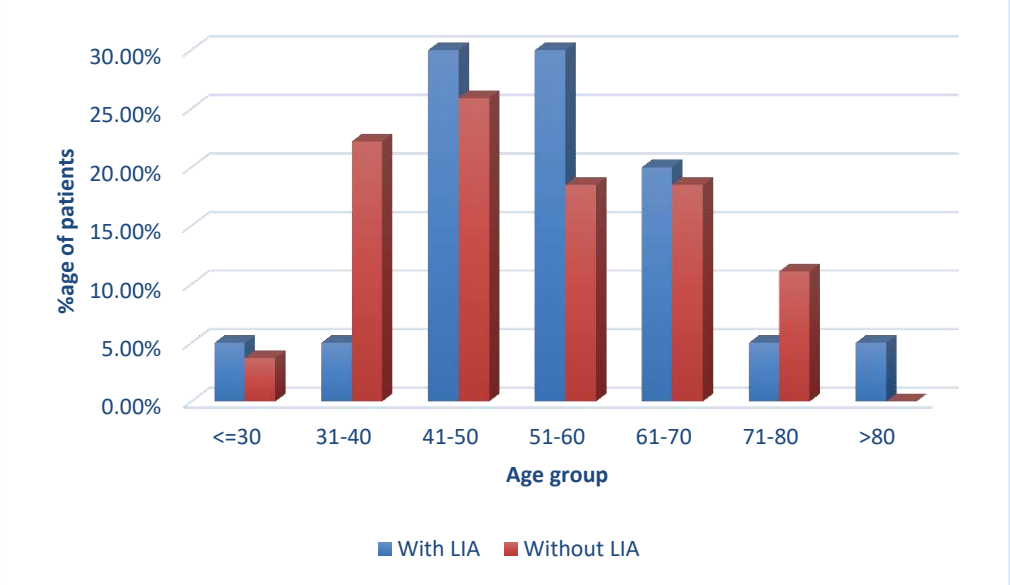
AGE

Table 2: Distribution of patients who underwent total hip arthroplasty according to age

Age	with LIA		Without LIA		Total		chi-square	p-value
	n	%	n	%	n	%		
<=30	1	5.0%	1	3.7%	2	4.3%	4.917	0.555
31-40	1	5.0%	6	22.2%	7	14.9%		
41-50	6	30.0%	7	25.9%	13	27.7%		
51-60	6	30.0%	5	18.5%	11	23.4%		
61-70	4	20.0%	5	18.5%	9	19.1%		
71-80	1	5.0%	3	11.1%	4	8.5%		
>80	1	5.0%	0	0.0%	1	2.1%		
	20	100.0%	27	100.0%	47	100.0%		

The chi-square test value of 4.917 with a p-value of 0.555 indicates no statistically significant difference in age distribution between individuals with and without LIA.

Figure 2: Majority of the patients were in the age group of 41 to 60 years of age.



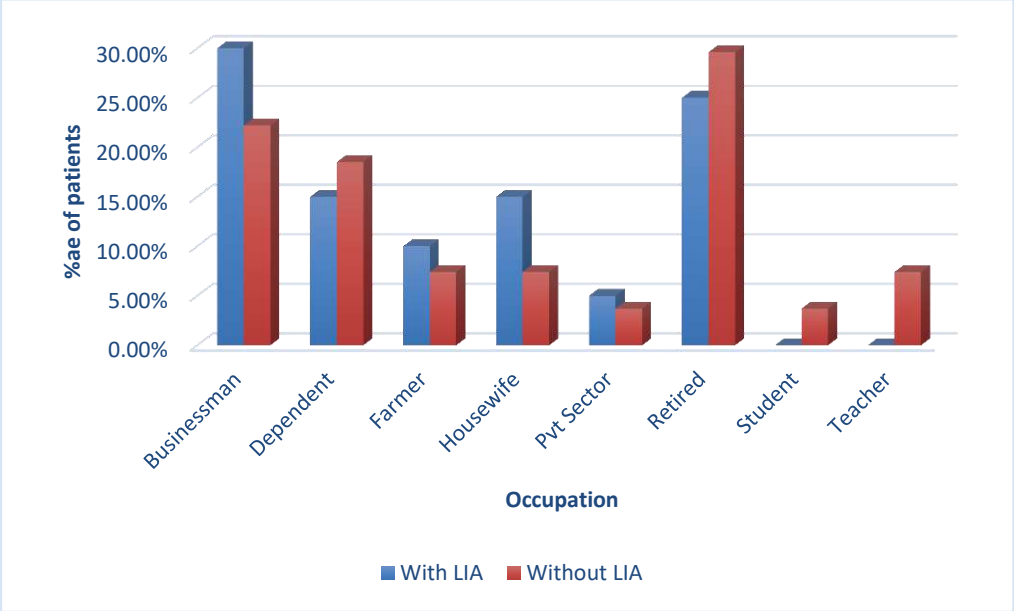
OCCUPATION

Table 3: Distribution of patients who underwent total hip arthoplasty according to occupation

	with LIA		Without LIA		Total		chi sqaure	p-value
	n	%	n	%	n	%		
Businessman	6	30.0%	6	22.2%	12	25.5%	3.426	0.843
Dependent	3	15.0%	5	18.5%	8	17.0%		
Farmer	2	10.0%	2	7.4%	4	8.5%		
Housewife	3	15.0%	2	7.4%	5	10.6%		
Pvt Sector	1	5.0%	1	3.7%	2	4.3%		
Retired	5	25.0%	8	29.6%	13	27.7%		
Student	0	0.0%	1	3.7%	1	2.1%		
Teacher	0	0.0%	2	7.4%	2	4.3%		
Total	20	100.0%	27	100.0%	47	100.0%		

The chi-square test result, with a value of 3.426 and a p-value of 0.843, indicates no statistically significant difference in occupational distribution between individuals with and without LIA.

Figure 3: Distribution of patients who underwent total hip arthoplasty according to occupation



SIDE OPERATED

Table 4: Distribution of patients who underwent total hip arthroplasty according to laterality

	with LIA		Without LIA		Total		chi square	p-value
	n	%	n	%	n	%		
left	9	45.0%	12	44.4%	21	44.7%	.001	0.970
right	11	55.0%	15	55.6%	26	55.3%		
Total	20	100.0%	27	100.0%	47	100.0%		

The chi-square test result was 0.001 with a p-value of 0.970, indicating no statistically significant difference in the side distribution between individuals with and without LIA.

Figure 4a: Distribution of patients according to laterality

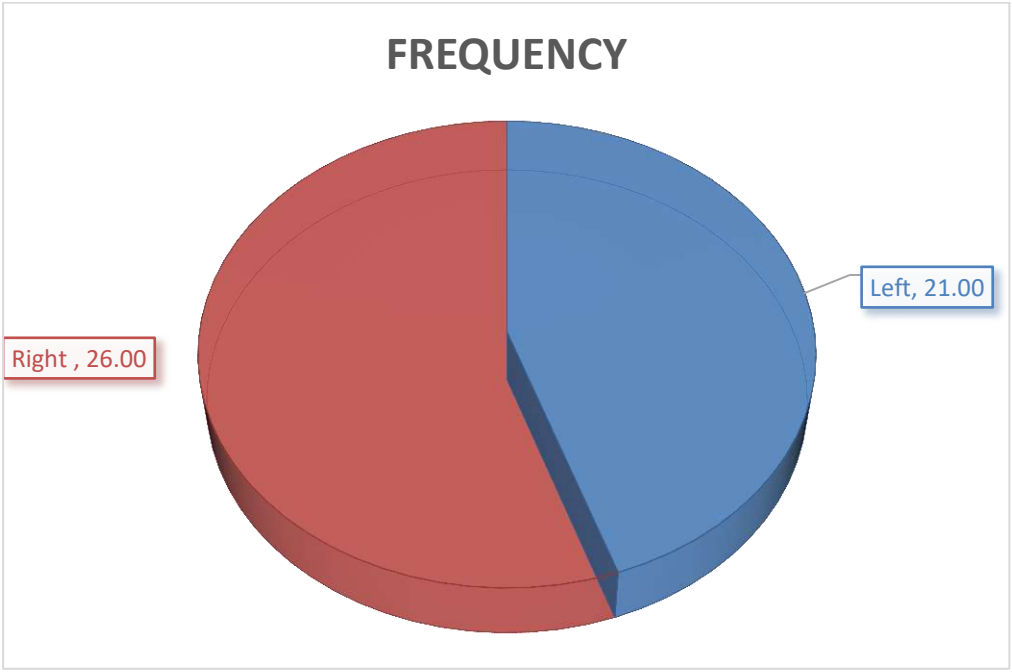
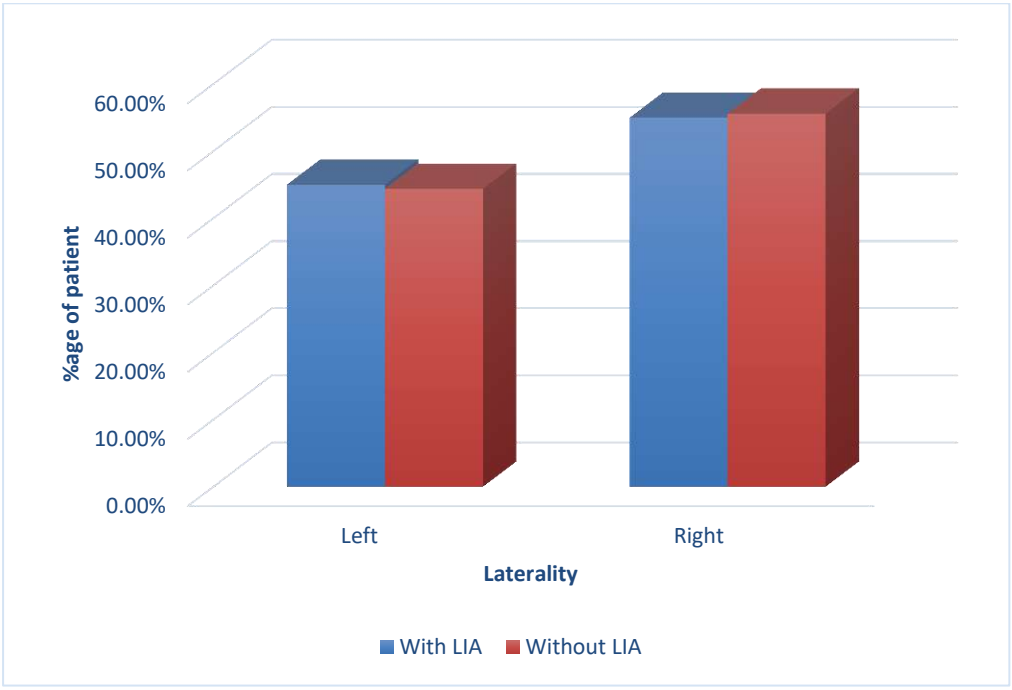


Figure 4b: Comparison of laterality with and without LIA



COMPARISON OF ETIOLOGIES

Table 5: Distribution of patients who underwent total hip arthroplasty according to diagnosis

	with LIA		Without LIA		Total		chi-square	p-value
	n	%	n	%	n	%		
Ankylosing spondylitis with secondary degeneration side	0	0.0%	2	7.4%	2	4.3%	7.722	0.259
AVN (Avascular Necrosis) Head of Femur	6	30.0%	6	22.2%	12	25.5%		
Fracture neck of femur	1	5.0%	6	22.2%	7	14.9%		
Fracture of the hip joint	0	0.0%	1	3.7%	1	2.1%		
Fracture of femur	1	5.0%	1	3.7%	2	4.3%		
Osteoarthritis hip joint	4	20.0%	1	3.7%	5	10.6%		
Secondary degeneration	8	40.0%	10	37.0%	18	38.3%		
Total	20	100.0%	27	100.0%	47	100.0%		

The chi-square test result is 7.722 with a p-value of 0.259, indicating no statistically significant difference in the distribution of diagnoses between individuals with and without LIA.

Figure 5a: Distribution of patients who underwent total hip arthroplasty according to diagnosis

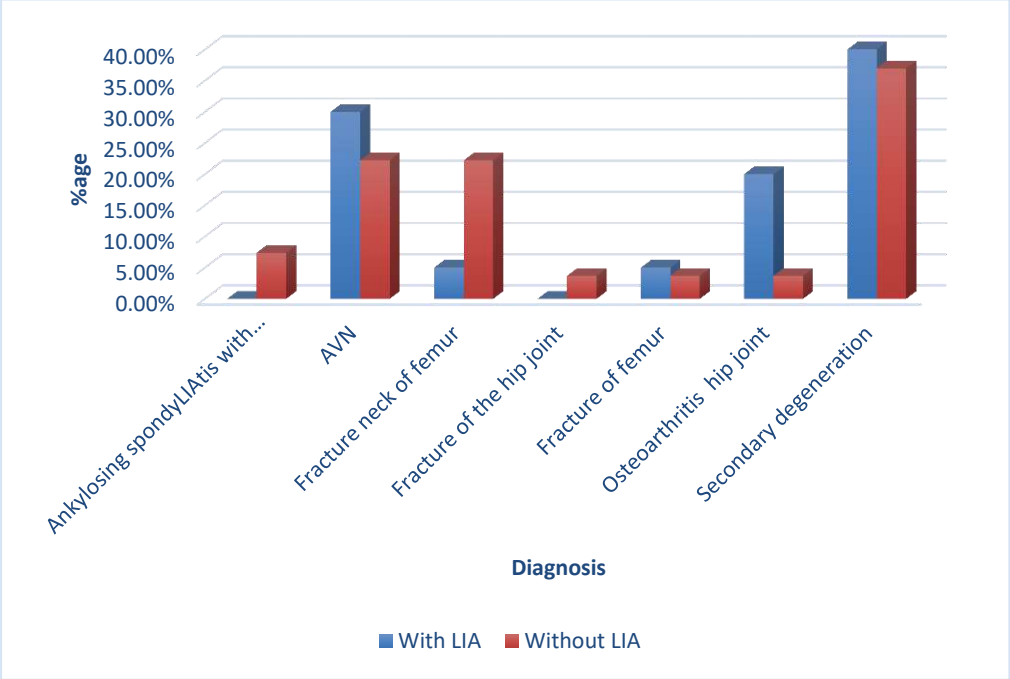
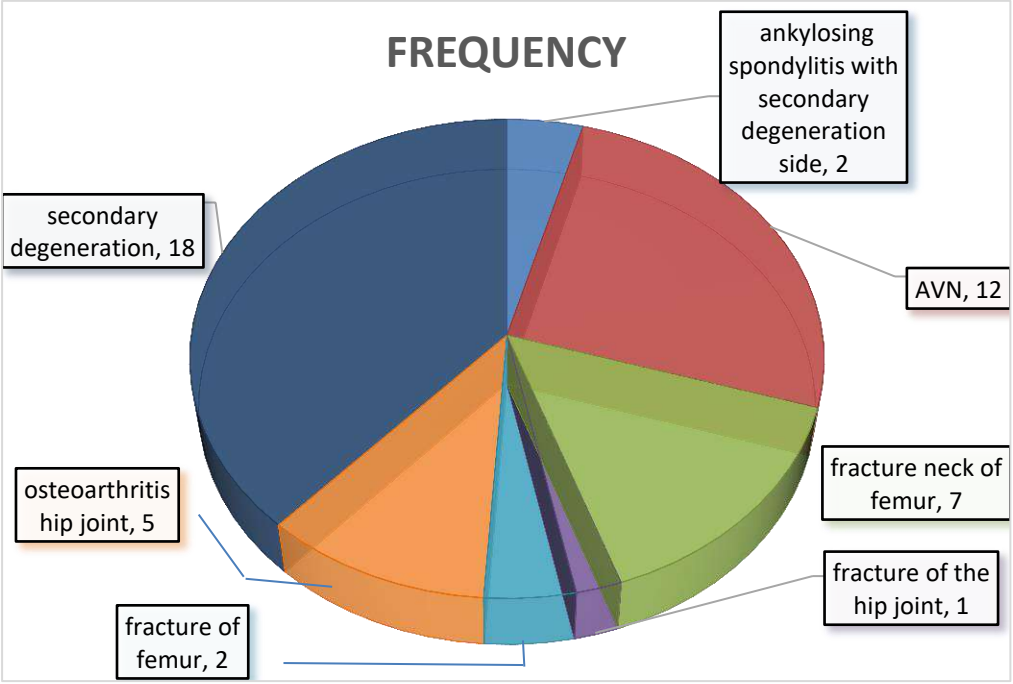


Figure 5b: Distribution of patients who underwent total hip arthroplasty according to diagnosis


FREQUENCY
ankylosing spondylitis with secondary degeneration side, 2
AVN, 12
fracture neck of femur, 7
fracture of the hip joint, 1
fracture of femur, 2
osteoarthritis hip joint, 5
secondary degeneration, 18

DURATION OF STAY

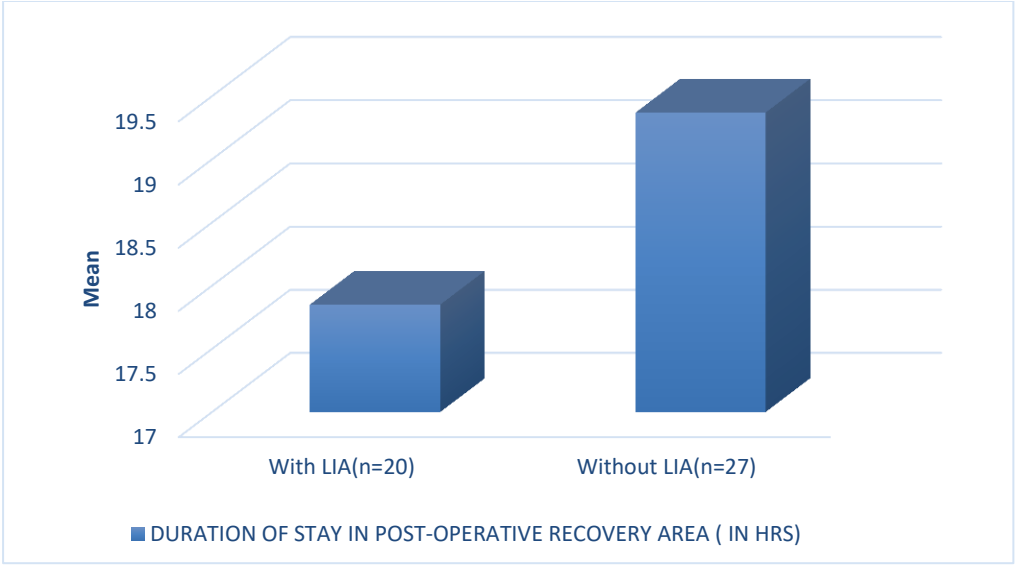
Table 6: Comparison of duration of stay in recovery are in patients who underwent total hip arthroplasty

	With LIA (n=20)	without LIA (n=27)		
	Mean ± SD	Mean ± SD	Mann-Whitney U	p-value
DURATION OF STAY IN POST-OPERATIVE RECOVERY AREA (IN HRS)	17.85 ± 2.641	19.37 ± 4.978	326	0.222

The data indicates that individuals with LIA spent, on average, 17.85 ± 2.641 hours in the post-operative recovery area, while those without LIA spent 19.37 ±4.978 hours on average.

The p-value of 0.222, suggests that there is no statistically significant difference in the duration of stay between individuals with and without LIA.

Figure 6: Comparison of duration of stay in recovery in patients who underwent total hip arthroplasty



PAIN ASSESSMENT

Pain was analysed using VAS score in both the groups at 0mins, 6hrs, 12hrs and 24 hrs

Table 7: Comparison of VAS (at rest) in patients who underwent total hip arthroplasty in both groups

VAS (AT REST	with LIA(n=20)		without LIA(n=27)		Mann-Whitney U	p-value
	Mean	Std. Deviation	Mean	Std. Deviation		
Baseline	5.05	0.605	5.07	0.730	276.5	0.87
0 Mins	1.90	0.788	2.52	0.753	384.5	0.007
6 hrs	2.45	0.826	3.07	1.207	344.5	0.084
12hrs	3.10	0.788	3.26	0.984	284	0.739
24hrs	2.85	0.988	3.41	1.083	360.5	0.038

At 0 minutes post-intervention in post recovery room (at rest), individuals with LIA had a mean VAS score of 1.90 ± 0.788, while those without LIA had a mean score of 2.52 ± 0.753. The p-value of ***0.007*** indicated a statistically significant difference in VAS scores in the immediate post-operative period between individuals with and without LIA.

At 6 hours and 12 hours there were differences in mean VAS scores between the two groups, the p-values were 0.084 and 0.739 respectively. These p-values indicate no statistically significant differences in VAS scores between individuals with and without LIA at 6 hours and 12 hours

At 24 hours post-intervention, individuals with LIA had a mean VAS score of 2.85 ± 0.988 the p value ***0.038*** indicated a statistically significant difference in VAS scores at rest between individuals with and without LIA.

Figure 7: Comparison of VAS (at rest) in patients who underwent total hip arthroplasty in both groups

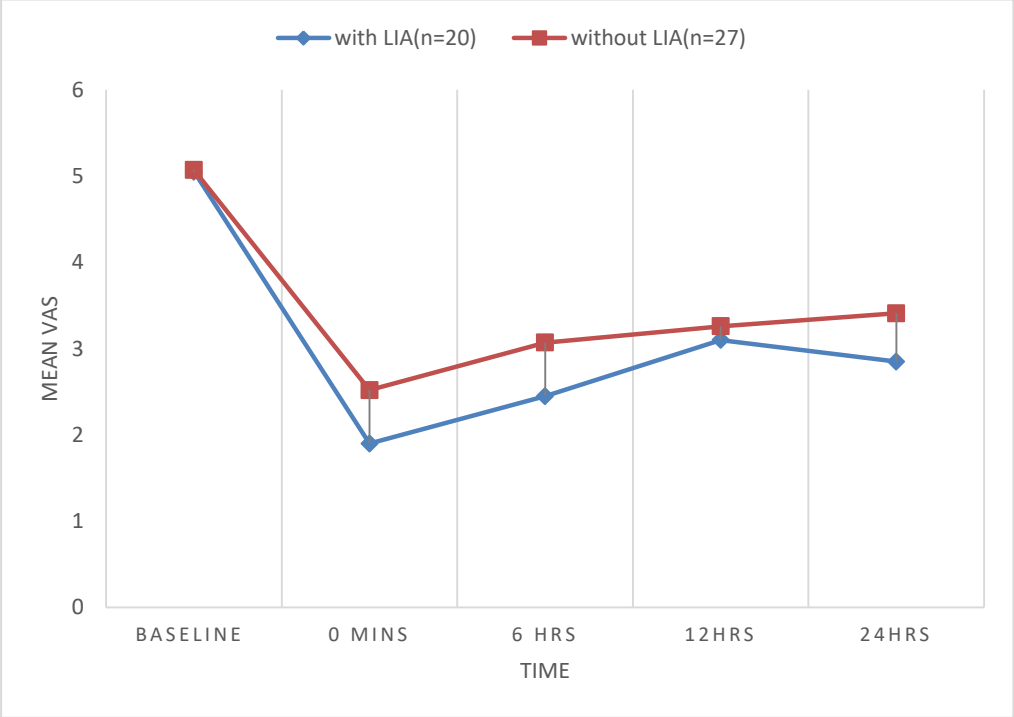


Table 8: Comparison of VAS (at dynamic mobilisation) in patients who underwent total hip arthroplasty in both groups

Vas (At Dynamic Mobilisation)	with LIA(n=20)		without LIA(n=27)		Mann-Whitney U	p-value
	Mean	Std. Deviation	Mean	Std. Deviation		
Baseline	6.10	0.641	6.30	.724	314	0.28
0 Mins	2.75	1.070	3.81	0.879	433.5	0.000
6 hrs	3.15	1.137	3.78	1.423	339	0.126
12hrs	4.30	1.081	3.96	1.091	223.5	0.292
24hrs	3.65	1.268	4.30	1.436	352.5	0.069

At 0 minutes post-intervention, individuals with LIA had a mean VAS score of 2.75 ± 1.070 during movement, while those without LIA had a mean of 3.81 ± 0.879. The p-value of 0.000, indicated a statistically significant difference in VAS scores during movement dynamic mobilization between individuals with and without LIA at this time point.

At 6 hours, 12 hours, and 24 hours post-intervention, although there were differences in mean VAS scores (at dynamic mobilisation) between the two groups, the p-values were 0.126, 0.292, and 0.069 respectively. Hence there were no statistically significant differences in VAS scores between individuals with and without LIA at 6 hours, 12 hours, and 24 hours post-intervention.

Therefore, the presence of LIA appears to significantly impact VAS scores (at dynamic mobilisation) immediately after the intervention, but not at later time points.

Figure 8: Comparison of VAS (at dynamic mobilisation) in patients who underwent THA in both groups (with LIA and without LIA)

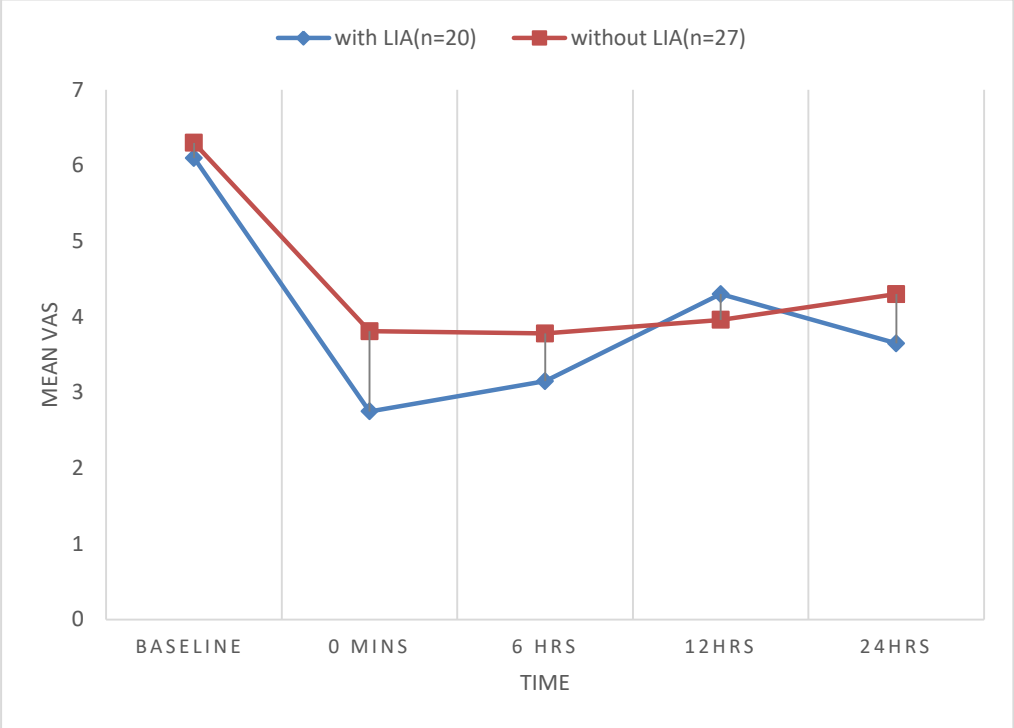
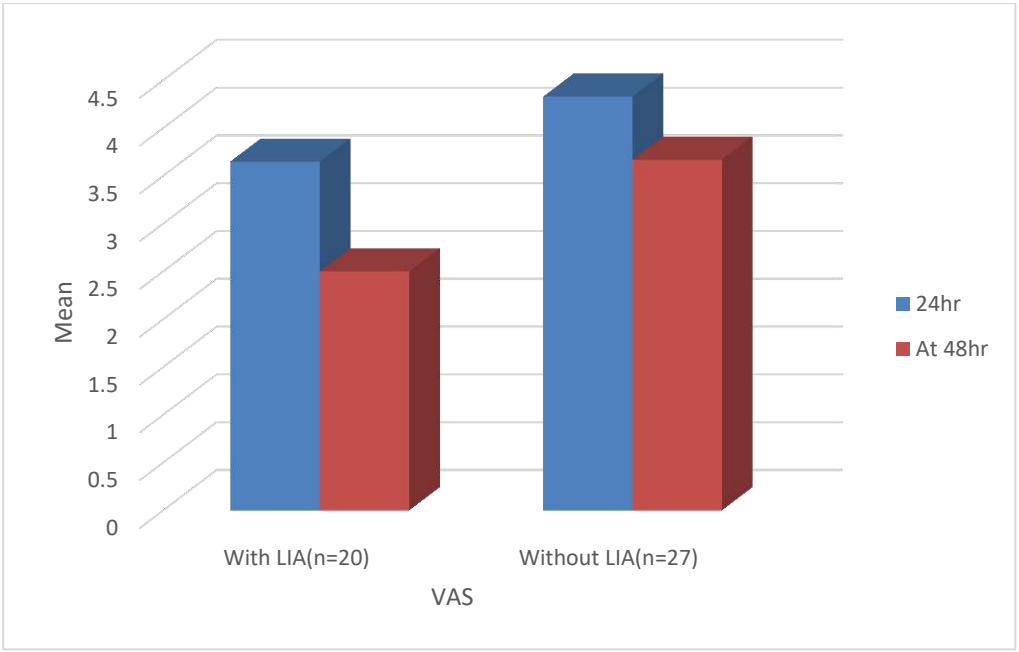


Table 9: Comparison of VAS (at dynamic mobilisation) in patients who underwent total hip arthroplasty in both groups

VAS(at dynamic mobilisation)	with LIA(n=20) Mean ± SD	without LIA(n=27) Mean ± SD	Mann-Whitney U	p-value
24hr	3.65 ±1.268	4.33 ±1.359	354.5	0.062
At 48hr	2.50 ±1.100	3.67 ±1.301	413	***0.002***

At 24 hours post-intervention, individuals with LIA had a mean VAS score at dynamic mobilisation of 3.65 ± 1.268, while those without LIA had a mean of 4.33 ± 1.359. At 48 hours post-intervention, individuals with LIA had a mean VAS score at dynamic mobilisation of 2.50 ± 1.100, while those without LIA had a mean of 3.67 ± 1.301. The p-value of 0.062 for 24 hours and *0.002* for 48 hours. This indicates that there is a statistically significant difference in VAS scores at dynamic mobilisation between individuals with and without LIA at 48 hours post-intervention, but not at 24 hours.

Figure 9: Comparison of VAS (at dynamic mobilisation) in patients who underwent total hip arthroplasty in both groups



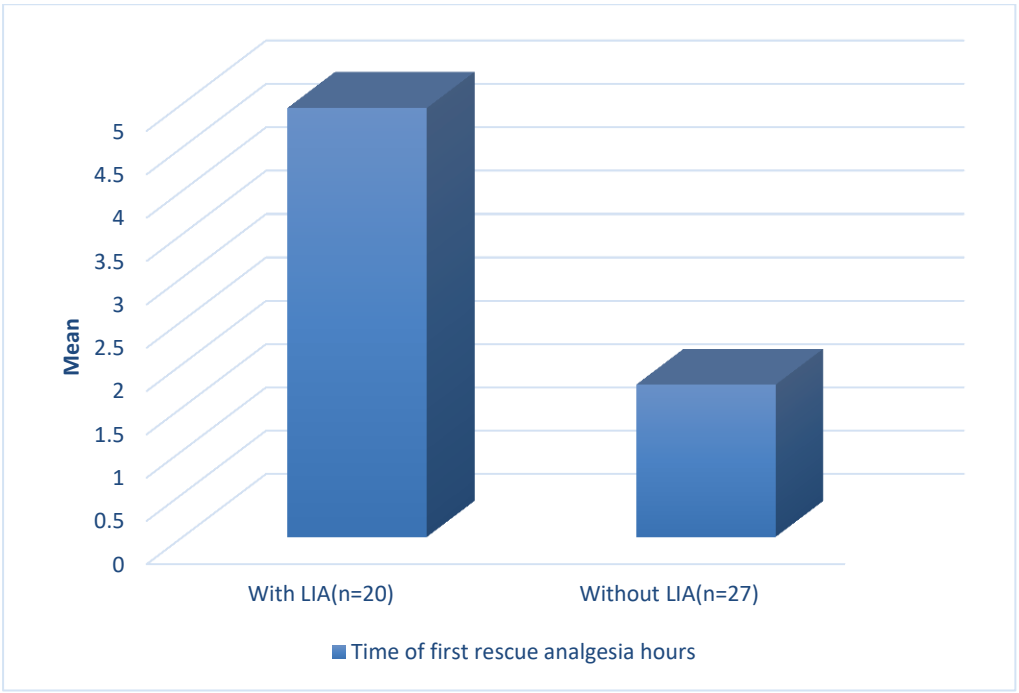
RESCUE ANALGESIA

Table 10: Comparison of Time of first rescue analgesia (hours) in patients who underwent THA in both groups

	with LIA (n=20)	without LIA (n=27)	Mann-Whitney U	p-value
	Mean ± SD	Mean ± SD		
Time of first rescue analgesia (hours)	4.950 ±2.6798	1.759 ±0.6559	65.5	***0.000***

The mean time of first rescue analgesia for individuals with LIA was 4.950 hours ± 2.6798 hours, while for those without LIA, it was 1.759 hours ± 0.6559 hours. The p-value of 0.000, indicated a statistically significant difference in the time of first rescue analgesia between individuals with and without LIA.

Figure 10: Comparison of Time of first rescue analgesia hours in patients who underwent THA in both groups



AMOUNT OF ANALGESIA

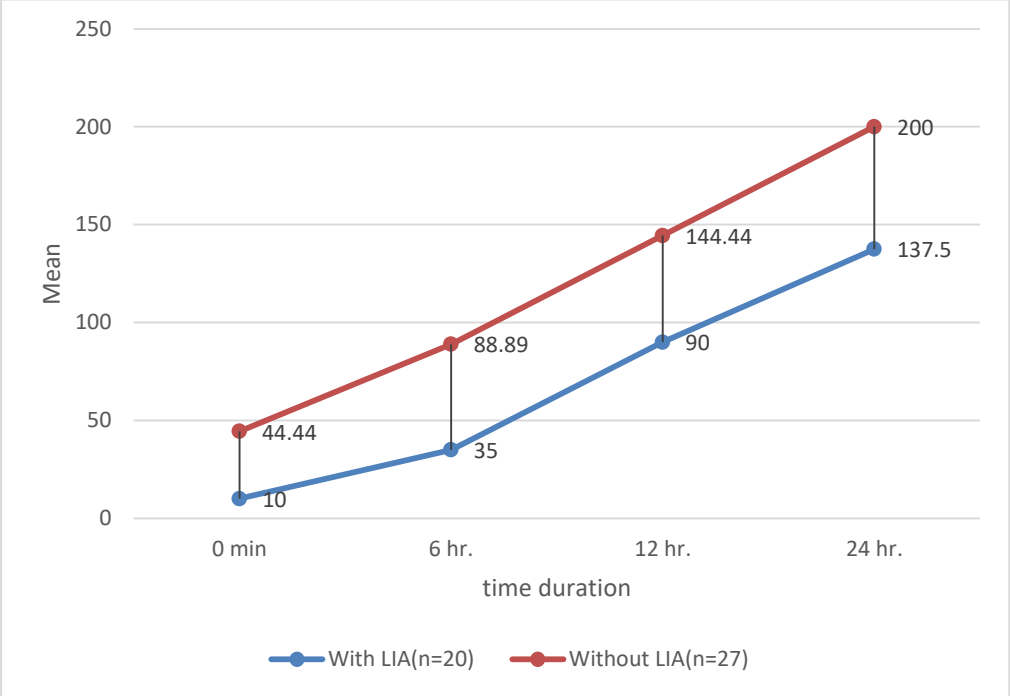
Table 11: Comparison of Amount and Type of rescue analgesia given in patients who underwent THA in both groups at different durations.

Total Amount and Type of rescue analgesia given	with LIA(n=20)	without LIA(n=27)	Mann-Whitney U	p-value
	Mean ± SD	Mean ± SD		
0 min	10.00 ± 20.520	44.44 ±16.013	456	***0.000***
6 hr.	35.00 ± 40.066	88.89 ±42.366	435	***0.000***
12 hr.	90.00 ± 50.262	144.44 ±54.302	413	***0.001***
24 hr.	137.50 ±53.496	200.00 ±62.017	421.5	***0.001***

At all time points post-intervention (0 minutes, 6 hours, 12 hours, and 24 hours) the p values were 0.00, 0.00, 0.001 and 0.001 respectively indicating individuals with LIA received significantly less total amount of rescue analgesia compared to those without LIA(as indicated by the p-values being less than 0.05 in all cases).

This suggests that individuals with LIA exhibited a significantly lesser amount of rescue analgesia till 24 hours post surgery, indicating potentially different pain management needs or responses between individuals with and without LIA.

Figure 11: Comparison of Amount and Type of rescue analgesia given in patients who underwent THA in both groups at different durations



FUNCTIONAL OUTCOME

Table 12: Comparison of Quadriceps muscle strength duration in patients who underwent THA in both groups

Quadriceps muscle strength	with LIA (n=20)	without LIA (n=27)	Mann-Whitney U	p-value
	Mean ± SD	Mean ± SD		
At 24hr	3.40 ±1.046	3.15 ±0.864	234	0.402
At 48hr	4.10 ±0.968	3.85 ±0.907	227.5	0.336

At 24 hours post-intervention, individuals with LIA had a mean quadriceps muscle strength of 3.40 ± 1.046, while those without LIA had a mean of 3.15 ± 0.864. At 48 hours post-intervention, individuals with LIA had a mean quadriceps muscle strength of 4.10 ± 0.968, while those without LIA had a mean of 3.85 ± 0.907.

The p-values of 0.402 for 24 hours and 0.336 for 48 hours, indicating that there are no statistically significant differences in quadriceps muscle strength between individuals with and without LIA at either time point.

Figure 12: Comparison of Quadriceps muscle strength duration in patients who underwent THA in both groups

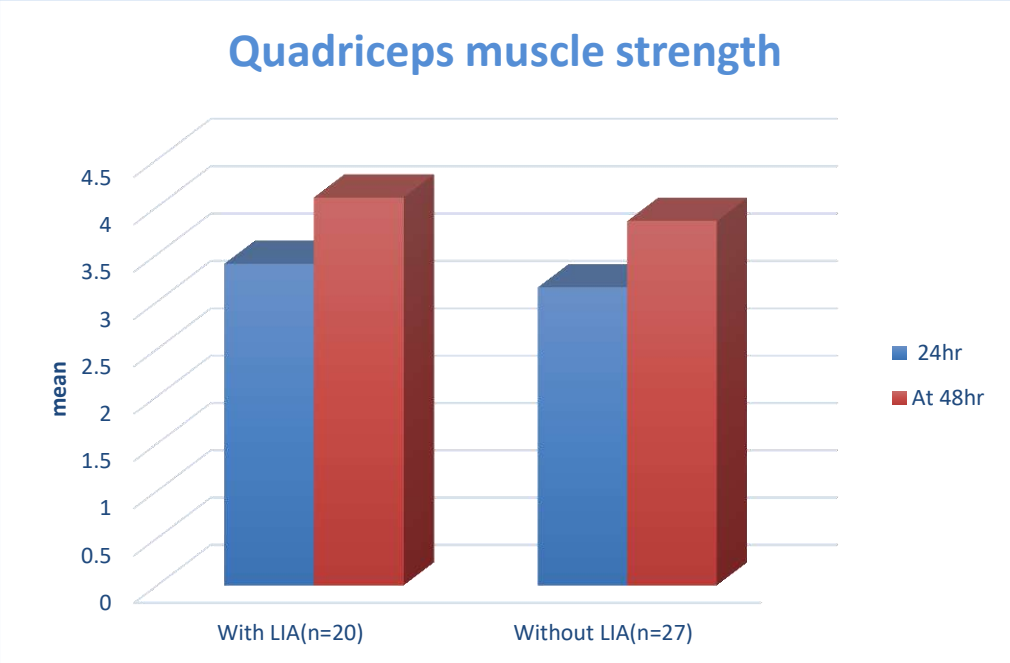


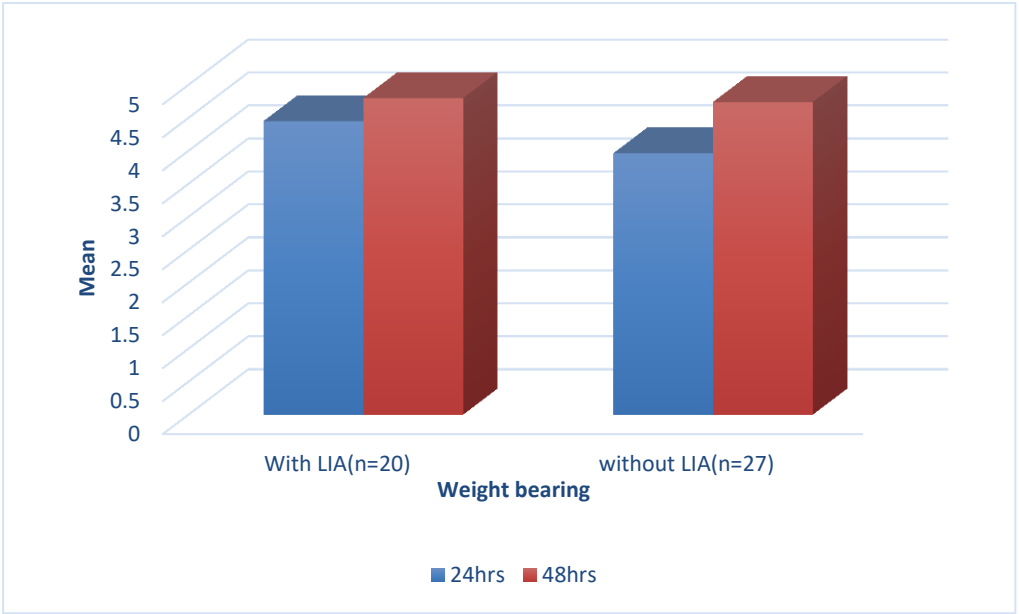
Table 13: Comparison of Weight-bearing in patients who underwent THA in both groups

Weight-bearing	with LIA(n=20)	without LIA(n=27)	Mann-Whitney U	p-value
	Mean ± SD	Mean ± SD		
24hrs	4.45 ±0.887	3.96 ±1.126	200	0.101
48hrs	4.80 ±0.523	4.74 ± 0.526	252	0.571

At 24 hours post-intervention, individuals with LIA had a mean weight-bearing ability of 4.45 ± 0.887, while those without LIA had a mean of 3.96 ± 1.126. At 48 hours post-intervention, individuals with LIA had a mean weight-bearing ability of 4.80 ± 0.523, while those without LIA had a mean of 4.74 ± 0.526.

The p-values of 0.101 for 24 hours and 0.571 for 48 hours. This indicates that there are no statistically significant differences in weight-bearing ability between individuals with and without LIA at either time point.

Figure 13: Comparison of Weight-bearing in patients who underwent THA in both groups



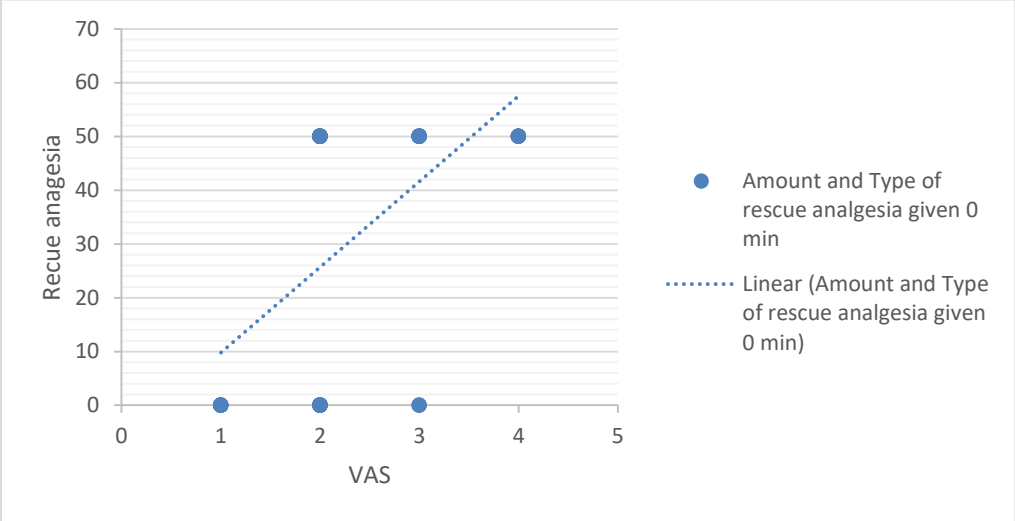
Correlation between VAS score and Rescue analgesia

Table 14: Correlation between VAS score (at rest) and Rescue analgesia

VAS score (at rest)	Rescue analgesia	Correlation	p-value
0 min	0 min	0.526	<0.001
6 hours	6 hours	0.72	<0.001
12 hours	12 hours	0.647	<0.001
24 hours	24 hours	0.513	<0.001

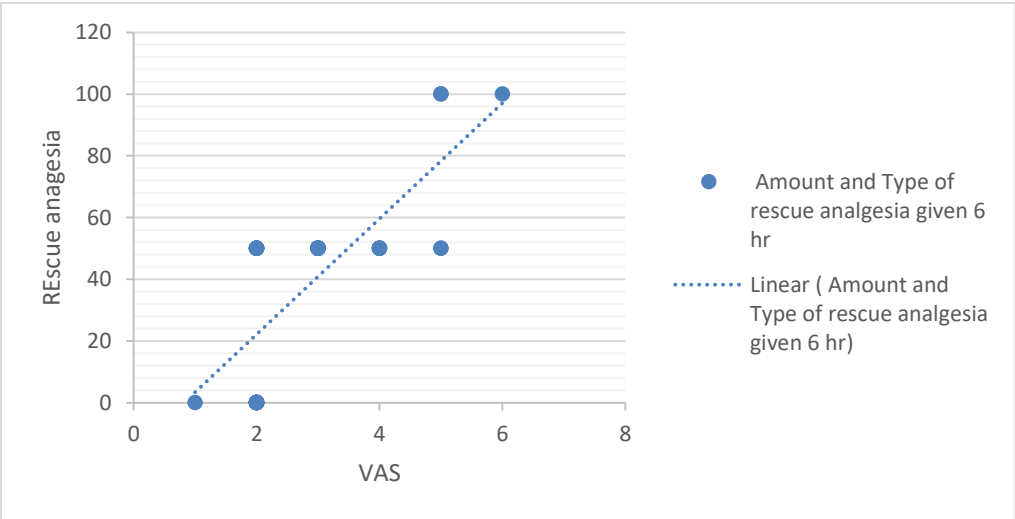
The data provided appears to show the correlation between VAS (Visual Analogue Scale) scores at rest and the use of rescue analgesia over different time points post-intervention (0 min, 6 hours, 12 hours, and 24 hours). The correlation values (ranging from 0.513 to 0.72) indicate a moderate to strong positive relationship between the VAS scores and the need for rescue analgesia at each time point. All p-values are <0.001, indicating that these correlations are statistically significant.

Figure 14a: Correlation between VAS (at rest) score and Rescue analgesia at 0 mins



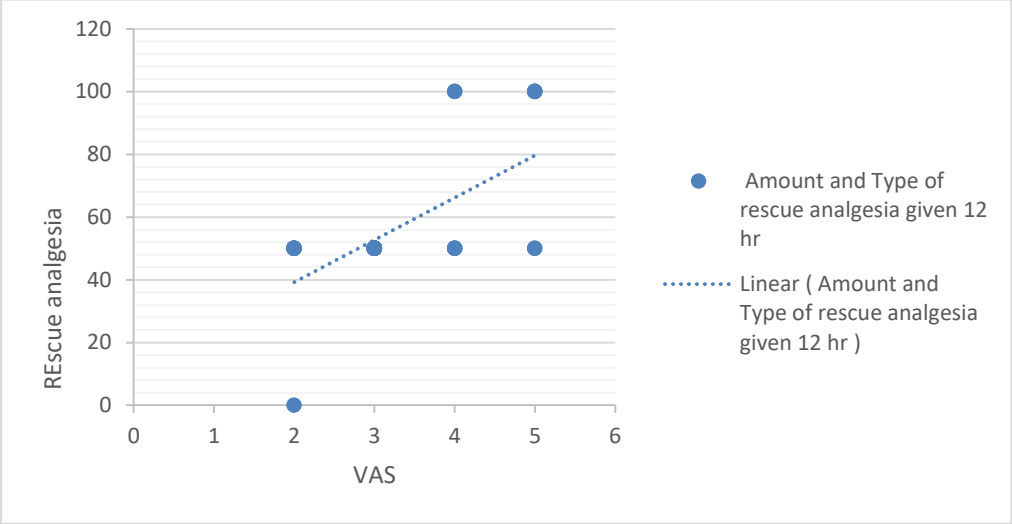
The data reveals a significant positive correlation between VAS (Visual Analogue Scale) scores at rest and the requirement for rescue analgesia at various time points post-intervention. At 0 minutes, the correlation is moderate ($r = 0.526$, $p < 0.001$), indicating that higher initial pain levels are moderately associated with the need for immediate analgesia.

Figure 14b: Correlation between VAS (at rest) score and Rescue analgesia at 6 hrs



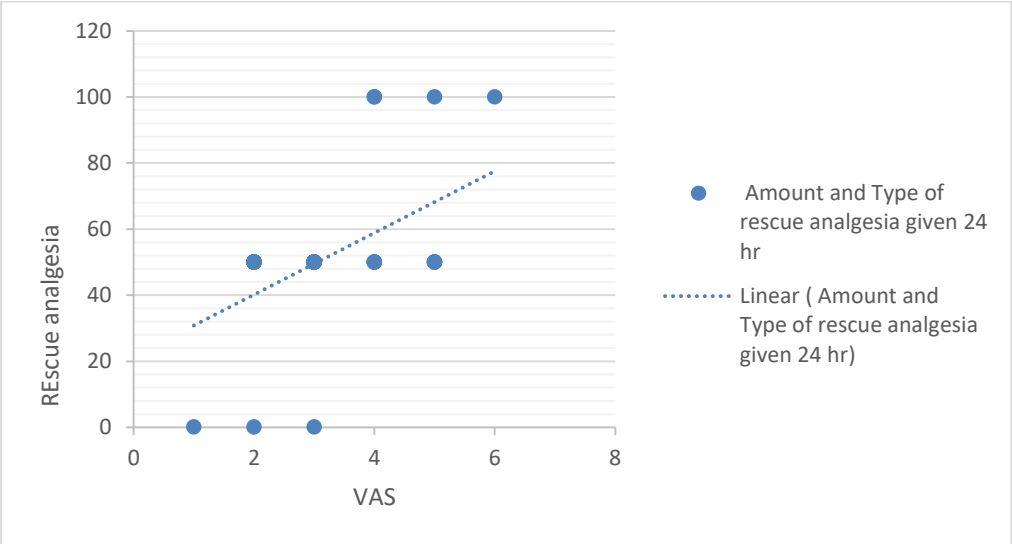
This correlation strengthens significantly at 6 hours post-intervention ($r = 0.72$, $p < 0.001$), suggesting that as time progresses, patients with higher pain scores are more Likely to require additional pain management.

Figure 14c: Correlation between VAS (at rest) score and Rescue analgesia at 12 hrs



At 12 hours, the correlation remains strong ($r = 0.647$, $p < 0.001$), though slightly lower than at 6 hours, indicating a continued but somewhat reduced association.

Figure 14d: Correlation between VAS(at rest) score and Rescue analgesia at 24 hrs



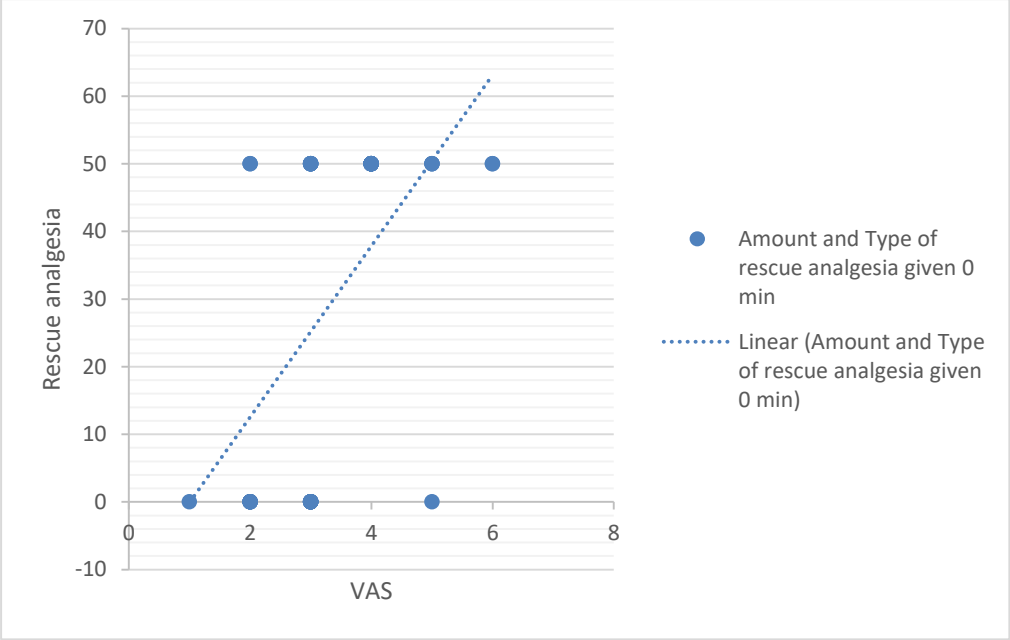
By 24 hours, the correlation decreases to a moderate level ($r = 0.513$, $p < 0.001$), implying that the need for rescue analgesia based on resting VAS scores diminishes over time but remains significant. Overall, these findings underscore the importance of vigilant pain assessment and timely administration of analgesia, particularly within the first 12 hours post-intervention, to effectively manage patient comfort.

Table 15: Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia

VAS score (at dynamic mobilisation)	Rescue analgesia	Correlation	p-value
0 min	0 min	0.557	<0.001
6 hours	6 hours	0.805	<0.001
12 hours	12 hours	0.611	<0.001
24 hours	24 hours	0.441	0.002

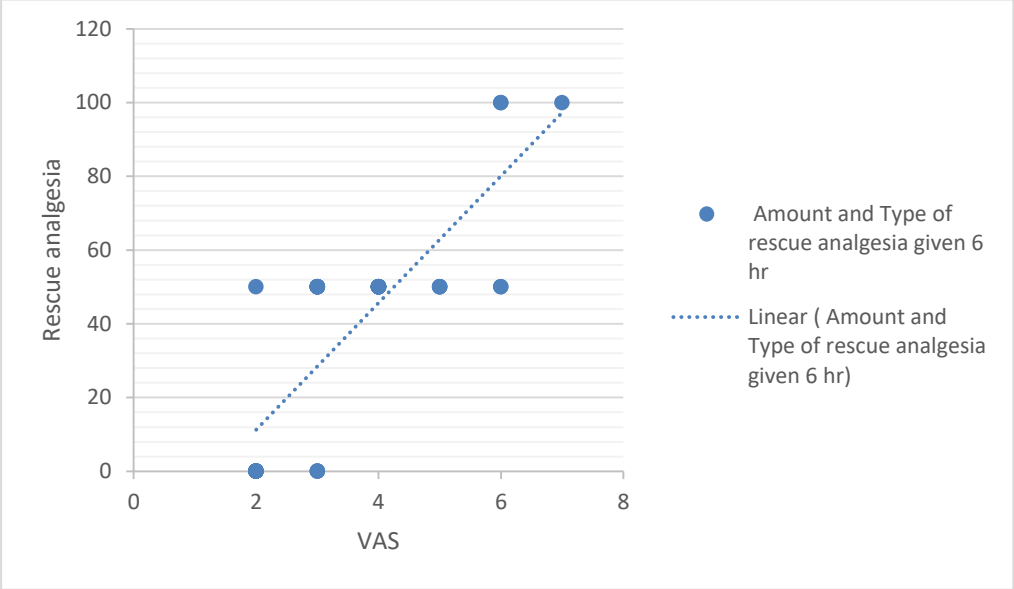
The data illustrates a significant positive correlation between VAS (Visual Analogue Scale) scores (at dynamic mobilisation) and the need for rescue analgesia at various time points following an intervention.

Figure 15a: Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 0 mins



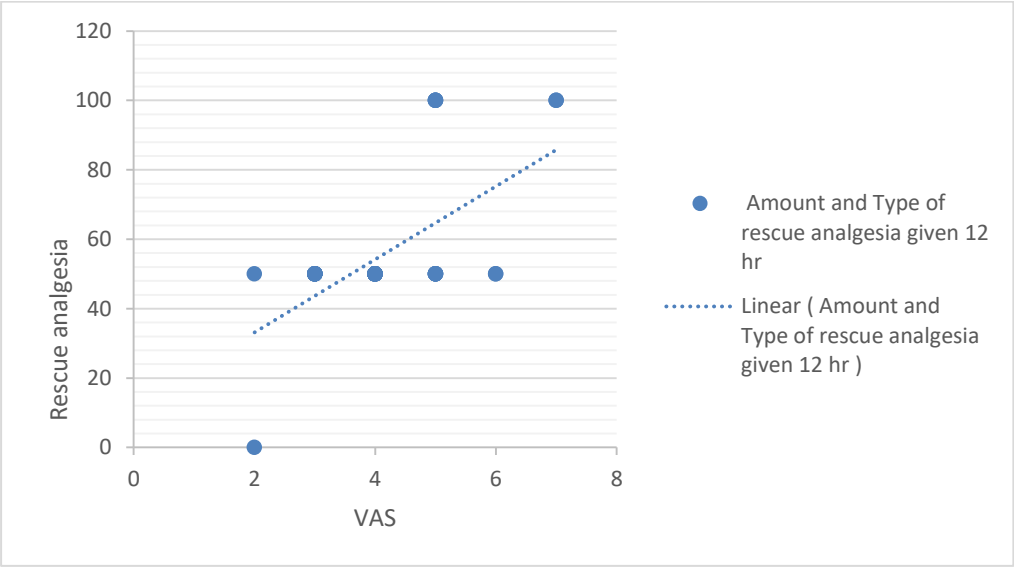
At 0 minutes, the correlation is moderate ($r = 0.557$, $p < 0.001$), suggesting that higher pain scores during movement immediately post-intervention are moderately associated with the requirement for immediate analgesia.

Figure 15b: Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 6hrs



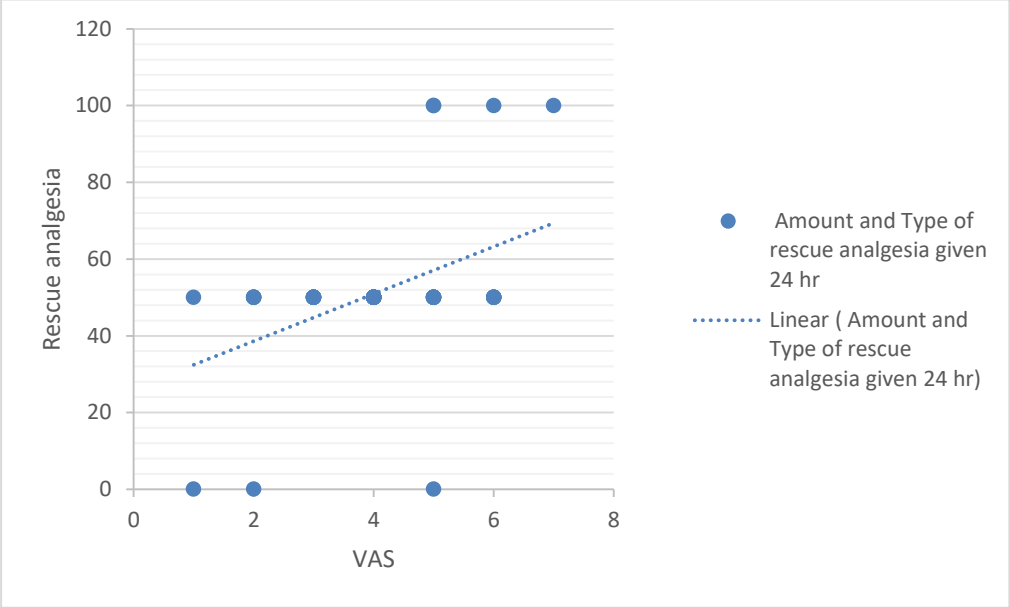
This correlation becomes very strong at 6 hours ($r = 0.805$, $p < 0.001$), indicating that patients experiencing higher pain levels during dynamic mobilisation are highly Likely to need additional pain relief at this time point.

Figure 15c: Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 12hrs



At 12 hours, the correlation, though strong ($r = 0.611$, $p < 0.001$), is somewhat reduced compared to 6 hours, reflecting a persistent but slightly diminished association.

Figure 15d: Correlation between VAS (at dynamic mobilisation) score and Rescue analgesia at 24hrs



By 24 hours, the correlation decreases to a moderate level ($r = 0.441$, $p = 0.002$), indicating that the relationship between pain scores at dynamic mobilisation and the need for rescue analgesia lessens over time but remains statistically significant.

COMPLICATIONS

Our study on the LIA technique have not reported any instances of local anesthesia toxicity despite the infiltration of large doses of local anesthetic. However, our study has limitations such as a small sample size and being conducted exclusively on a limited number of total hip arthroplasty patients. Therefore, these findings cannot be generalized to imply that there is no risk of local anesthetic systemic toxicity.

DISCUSSION

AGE, SEX AND LATERALITY:

Overall, 31.9% of the total sample are female and 68.1% are male. Among the group with LIA, 30.0% are female and 70.0% are male. In the group without LIA, 33.3% are female and 66.7% are male. The p-value of 0.808, indicating both the groups were comparable with respect to gender distribution between the groups with and without LIA. The mean age of patients in the present study was 55.20 ±12.31 among patients who were given LIA while for those without LIA were 51.15±14.20 years.

Anderson et al. conducted a study in 2007[14] in Denmark on patients undergoing THA. In their study treatment group were given LIA (n=19) while the control group wasn't given LIA (n=18). The study had overall higher percentage of males with 55.6% males which was in accordance with the present study. The median age of the patients in their study was 62 years among cases while it was 64 years among the control group. No significant difference was seen among age group in their study.

The study by Anderson et al.[50] was done on 40 cases and 40 controls undergoing total hip arthroplasty found more females than males. There were 22 female cases in the experimental group compared to 24 in the control group. This was in contrast to the present study. The mean age of the patients in their study for cases (with LIA) was 60±15 while for controls it was 66±14 years. No significant difference was seen among age groups in their study which was in accordance with the present study.

Chen et al.[51] in a 2010 in study Ninety-two patients undergoing THA were randomised to receive continuous intra-articular infusion of either 0.5% bupivacaine(n=45) or 0.9% normal saline(n=46) at a flow rate of 2 mL/h via a PCIP for 48 h. Among cases 62.2% patients were males while among saline group 56.5% patients were males with overall male percentage of 59.4% which was in accordance to the present study. in the same study, the mean age of the patients was 52±12.6 years who

were given bupivacaine while in the saline group, the mean age was 54±13.7 years. This was in accordance with the present study.

In present study overall, the chi-square test result is 0.001 with a p-value of 0.970, indicating no statistically significant difference in the side distribution of the condition between individuals with and without LIA.

A 2010 study conducted by Chen et al.[51] found that 55.5% of the left side was involved in patients who were given LIA while in other group 47.8% of the patients were undergoing THA for left side. Overall, 51.6% had involvement of left side while in present study in 44.7% left side was involved.

Time in recovery area:

In present study individuals with LIA spent, on average, 17.85±2.64 hours in the post-operative recovery area, while those without LIA spent 19.37±4.97 hours on average. The p-value of 0.222, suggesting that there is no statistically significant difference in the duration of stay between individuals with and without LIA. Therefore, based on this analysis, the presence of LIA does not appear to significantly impact the duration of stay in the post-operative recovery area.

Functional outcome:

Quadriceps muscle strength

At 24 hours post-intervention, individuals with LIA had a mean quadriceps muscle strength of 3.40±1.04, while those without LIA had a mean of 3.15±0.86. At 48 hours post-intervention, individuals with LIA had a mean quadriceps muscle strength of 4.10±0.96, while those without LIA had a mean of 3.85 ±0.90. The presence of LIA does not seem to significantly affect quadriceps muscle strength at 24 hours or 48 hours post-intervention.

No difference in quadriceps muscle strength between LIA and without LIA since quadriceps muscle was not disturbed during surgery. The result of the study were in accordance with the study conducted by Kerr et al. who demonstrated that local infiltration affects only the surgical area and does not interfere with the muscle strength of the lower limbs.[11]

Weight Bearing:

The p-values of 0.101 for 24 hours and 0.571 for 48 hours. This indicates that there are no statistically significant differences in weight-bearing ability between individuals with and without LIA at either time point.

Pain Assesment

The comparison of Visual Analogue Scale (VAS) scores (at rest) between patients who underwent THA with and without LIA reveals significant findings at specific time points.

At 0 minutes post-operation, patients who received LIA reported significantly lower pain scores compared to those who did not receive LIA, with mean scores of 1.90 (±0.788) and 2.52 (±0.753) respectively (p=0.007). Although the VAS scores at 6 hours post-surgery was significantly different between the groups, there was a trend toward lower pain in the LIA group, with mean scores of 2.45 (±0.826) compared to 3.07 (±1.207) in the non-LIA group (p=0.084). At 12 hours post-operation, there was no significant difference in pain scores between the two groups. However, by 24 hours post-operation, patients in the LIA group again reported significantly lower pain scores, with mean scores of 2.85 (±0.988) compared to 3.41 (±1.083) in the non-LIA group (p=0.038). Thus we believe that at 24hrs when effect of combined spinal and epidural anesthesia will wean off at that time LIA will decrease the pain.

These results suggested that LIA can effectively reduce pain at rest immediately after surgery and at 24 hours post-operation.

At 0 minutes post-intervention, individuals with LIA had a mean VAS score (at dynamic mobilization) of 2.75 ±1.07, while those without LIA had a mean of 3.81 ± 0.87,(p-value of <0.001).

At 6 hours, 12 hours, and 24 hours post-intervention, although there were no differences in mean VAS scores (at dynamic mobilization) between the two groups.(p>0.05)

At 24 hours post-intervention, individuals with LIA had a mean VAS score (at dynamic mobilization) of 3.65 ± 1.268, while those without LIA

had a mean of 4.33 ± 1.359. At 48 hours post-intervention, individuals with LIA had a mean VAS score (at dynamic mobilization) of 2.50 ± 1.100, while those without LIA had a mean of 3.67 ± 1.301. The p-value of 0.062 for the 24-hour post-intervention VAS scores (at dynamic mobilization), indicating no statistically significant difference at this time point. However, for the 48-hour post-intervention VAS scores (at dynamic mobilization), the test yielded a p-value of 0.002, indicating a statistically significant difference. This suggests that the presence of LIA significantly affects VAS scores (at dynamic mobilization) at 48 hours, potentially indicating a slower recovery or higher pain levels in individuals without LIA.

Andersen et al.[14] in 2007 conducted a study comparing the analgesic effects of wound infiltration with an intraoperative bolus followed by a catheter top-up at 8 hours postoperatively to epidural analgesia in patients undergoing total hip arthroplasty (THA). Their findings indicated that patients who received Local Infiltration Analgesia (LIA) required fewer opioids, had shorter hospital stays, and exhibited better mobilization. Additionally, these patients reported significantly lower pain levels, measured by the Visual Analogue Scale (VAS), at both rest and during movement from 20 to 96 hours postoperatively, even after the cessation of active pain treatment at 20 hours postoperatively.

In a 2020 meta-analysis conducted by Liu et al.[52], which included a total of 412 patients undergoing total knee arthroplasty (TKA) and 200 patients undergoing total hip arthroplasty (THA) from 7 and 3 randomized controlled trials (RCTs), respectively, it was found that local infiltration analgesia resulted in lower Visual Analogue Scale (VAS) scores at rest compared to epidural analgesia after 48 hours and 72 hours for TKA patients. For THA patients, local infiltration was associated with lower VAS scores at rest after 12 hours. During movement, local infiltration was linked to lower VAS scores after 48 hours for TKA patients, while for THA patients, it was associated with higher VAS scores at movement after 24 hours.

Various systematic reviews and meta-analyses have compared the efficacy of local infiltration versus epidural analgesia in managing pain

for patients undergoing TKA or THA. A meta-analysis by Yan et al.[53] (2020) suggested that local infiltration provides better pain relief and contributes to improved range of motion in TKA patients.

In another study, Specht et al.[54] evaluated an LIA regimen that included intra-operative ropivacaine, epinephrine, and ketorolac infiltration followed by intra-articular boluses at 10 and 22 hours postoperatively. This was compared to a similar regimen where the postoperative bolus was saline instead of the LIA mixture, in 60 THA patients. The study found no significant differences in pain scores or opioid consumption between the groups, although there was a non-significant trend toward a shorter hospital stay in the intervention group. This study concluded that the addition of a postoperative bolus did not provide extra benefits over the intra-operative LIA alone.

These studies generally suggest that the LIA technique is effective in providing pain relief after THA and reducing opioid use.

Despite these positive results, two recent trials question the added value of LIA within a multimodal analgesic regimen. Andersen et al.,[55] in a 2011 study, assessed the efficacy of LIA compared to placebo in 12 patients undergoing bilateral THA. Each patient received intra-operative infiltration of a ropivacaine-epinephrine solution in one hip and saline in the other, with follow-up boluses administered at 8 and 24 hours postoperatively. All patients were on a multimodal analgesic regimen (gabapentin, celecoxib, and acetaminophen) initiated preoperatively. The study found that postoperative pain scores were similarly low for both hips, leading the authors to conclude that the LIA technique did not provide additional benefits beyond the multimodal approach.

Rescue analgesia and Amount of analgesia

The mean time to first rescue analgesia was significantly longer for individuals who received Local Infiltration Analgesia (LIA) compared to those who did not. For the LIA group, the mean time was 4.950 ± 2.6798 hours. In contrast, for the group without LIA, the mean time was 1.759 ± 0.6559 hours. This difference was found to be statistically significant (p-value<0.000), indicating that individuals with LIA

experienced a delayed onset of the need for rescue analgesia compared to those without LIA. We in the present study found a positive correlation between total anaesthesia given and pain score. As the pain score increases the consumption of total anaesthesia also increases. Also the body is under surgical stress and patient have anxiety about the surgical procedure so LIA helps the patient in being pain free thus helping patient physically and psychologically.

Also at all time points post-intervention (0 minutes, 6 hours, 12 hours, and 24 hours), individuals with LIA received significantly less total amount of rescue analgesia compared to those without LIA, as indicated by the p-values being <0.05 in all cases.

In a study by Andersen et al. (2007)[14] it was found that the median amount of rescue medication administered was significantly lower in the treatment group than in the control group from 8 h to 96 h postoperatively which was comparable to the present study.

Vig et al.[56] conducted a randomized controlled trial comparing the functional outcome following the use of local infiltration analgesia (LIA) with combined spinal epidural analgesia (CSEA) (group A) versus CSEA alone(group B) in patients undergoing primary unilateral osteoarthritis of the knee. The distribution of mean Total opioid consumption among the cases studied is significantly higher in Group B compared to Group A ($P < 0.001$). This was in accordance with the present study.

Chen et al.[51] in their study found that patients who were not given LIA required more dose of rescue analgesia as compared to who were given LIA.

Marques et al.[36] in a study conducted a meta-analysis and reported that rescue analgesia consumption was reduced compared with untreated control patients and there was a general observation of early mobilisation, reduced vomiting and nausea, and early hospital discharge.

Thus we conclude that LIA provides significant pain relief in the early postoperative period and hence is associated with higher patient satisfaction. It helps in early mobilisation of the patient and help in both

physical and psychological health of patient. LIA significantly reduces rescue analgesia requirement and thus reducing opioid-related side effects. The long-term effects of LIA use are yet to be studied.

SUMMARY AND CONCLUSION

This study was conducted at the Department of Orthopaedics, Dayanand Medical College & Hospital, Ludhiana to evaluate the efficacy of local infiltration of analgesia on post-operative pain management in patient undergoing total hip replacement. Also, the comparison between the functional outcome of patients being given combined spinal and epidural anesthesia with and without LIA was assessed.

The results of the our study are summarized below:

- The presence of LIA appears to significantly impact VAS scores at rest showed a significant difference between groups immediately post-operation and at 24 hours, with lower scores indicating potentially lower pain levels in the LIA group.
- The presence of LIA appears to significantly impact Visual Analogue Scale (VAS) scores at dynamic mobilization in comparison to those without LIA, particularly evident immediately after the intervention and at 48 hours post-intervention.
- Individuals with LIA tend to require rescue analgesia later than those without LIA, suggesting a potentially different pain management profile or response to treatment between the two groups.
- Individuals with LIA required less rescue analgesia overall throughout the duration of the study period, indicating potentially different pain management needs or responses between individuals with and without LIA.
- Age may influence the amount of rescue analgesia required at specific time points post-intervention, with older individuals potentially requiring more rescue analgesia than younger individuals, particularly at 6 hours and 12 hours post-intervention.

- There is no significant difference in gender, age, occupation, employment, laterality and diagnosis distribution between patients who were given LIA and who were not given LIA.
- The presence of local infiltration analgesia (LIA) did not have a significant impact on the duration of stay in the post-surgical recovery area.
- There were no significant differences in quadriceps muscle strength between patients with and without LIA at 24^{th} and 48^{th} hour post-operation.
- There were no any significant differences in weight-bearing ability between patients with and without LIA at 24^{th} and 48^{th} hour post-operation.

CONCLUSION

Therefore, we conclude that local infiltration analgesia (LIA) offers significant pain relief during the early postoperative period, leading to higher levels of patient satisfaction. LIA significantly reduces rescue analgesia requirement and thus reducing opioid-related side effects. The long-term effects of LIA use are yet to be studied.

Limitation of present study are that:

- The sample size was small.
- The average observation time was 48hrs, which is relatively short evaluation period.
- A large sample size with extended observation time are recommended for future studies to strengthen their validity.

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s no	MRD No	INITIALS	Age	Gender	Occupation	Employment Status	Date of Admission	Date of Discharge	Date of Procedure	Procedure	Group
-	-	-	-	-	-	-	-	-	-	-	With LIA/Without
1	1062962	IS	68	Male	Retired	Not working	01/09/2022	07/09/2022	02/09/22	THR left side	Without LIA
2	1365509	HS	65	Male	Retired	Not working	02/09/2022	07/09/2022	03/09/22	THR right side	With LIA
3	1373627	SS	39	Male	Businessman	Working	05/09/2022	19/09/2022	06/09/22	THR left side	Without LIA
4	1373627	SS	39	Male	Businessman	Working	05/09/2022	19/9/2022	06/09/22	THR right side	Without LIA
5	352446	BB	68	Male	Retired	Not working	25/9/2022	29/9/2022	26/09/2022	THR right side	Without LIA
6	1396542	SK	59	Female	Farmer	Working	13/10/2022	18/10/2022	13/10/2022	THR right side	With LIA
7	1394971	RK	39	Male	Pvt Sector	Working	27/10/2022	01/11/2022	29/10/2022	THR left side	Without LIA
8	1402976	MK	76	Female	Housewife	Not working	31/10/2022	6/11/2022	1/11/2022	THR left side	With LIA
9	1408888	GS	31	Male	Businessman	Working	4/11/2022	9/11/2022	05/11/22	THR right side	Without LIA
10	928086	PK	43	Male	Businessman	Working	4/11/2022	9/11/2022	5/11/2022	THR left side	Without LIA
11	1405138	SP	68	Male	Retired	Not working	9/11/2022	15/11/2022	10/11/2022	THR right side	With LIA
12	1414459	GK	47	Female	Housewife	Working	14/11/2022	20/11/2022	15/11/2022	THR left side	With LIA
13	1416751	SB	38	Male	Pvt Sector	Working	18/11/2022	24/11/2022	19/11/2022	THR right side	With LIA
14	935926	BS	49	Male	Dependent	Working	15/11/2022	26/11/2022	21/11/2022	THR left side	Without LIA
15	1418254	VK	62	Male	Retired	Not working	21/11/2022	27/11/2022	22/11/2022	THR right side	With LIA
16	1418272	SK	71	Female	Retired	Not working	21/11/2022	28/11/2022	22/11/2022	THR right side	Without LIA
17	1422573	GK	61	Female	Retired	Not working	28/11/2022	3/12/2022	28/11/2022	THR left side	Without LIA
18	1423246	JS	49	Male	Businessman	Working	29/11/2022	6/12/2022	1/12/2022	THR left side	With LIA
19	719601	GS	47	Male	Teacher	Working	8/12/2022	13/12/2022	9/12/2022	THR left side	Without LIA
20	1403304	MS	31	Male	Dependent	Working	11/12/2022	16/12/2022	12/12/2022	THR left side	Without LIA
21	910472	NS	52	Female	Housewife	Not working	1/2/2023	7/2/2023	2/2/2023	THR right side	Without LIA
22	1457198	AK	55	Female	Housewife	Not working	4/2/2023	10/2/2023	6/2/2023	THR left side	Without LIA
23	1117083	KS	66	Male	Retired	Not working	15/2/2023	22/2/2023	16/2/2023	THR left side	With LIA
24	1466632	BK	49	Male	Dependent	Working	20/02/2023	7/3/2023	21/02/2023	THR right side	Without LIA
25	1394971	RK	34	Male	Businessman	Working	28/02/2023	6/3/2023	2/3/2023	THR right side	Without LIA
26	1466632	BK	49	Male	Dependent	Working	20/2/2023	7/3/2023	2/3/2023	THR left side	With LIA
27	767889	HK	81	Female	Retired	Not working	6/3/2023	11/3/2023	3/7/2023	THR right side	With LIA

s no	MRD No	Approach	Diagnosis	DURATION OF STAY IN POST OPERATIVE RECOVERY AREA (IN HRS)	Quadriceps muscle strength	
-	-	-	-	-	At 24hr	At 48hr
1	1062962	Lateral	osteoarthritis left hip joint	20hrs	2	3
2	1365509	Posterior	osteoarthritis right hip joint	16hrs	2	3
3	1373627	Posterior	ankylosing spondylitis with secondary degeneration of hip left side	18hrs	5	5
4	1373627	Posterior	ankylosing spondylitis with secondary degeneration of hip right side	19hrs	3	4
5	352446	Lateral	secondary degeneration right hip joint	20hrs	3	4
6	1396542	Posterior	secondary degeneration of right hip	18hrs	3	4
7	1394971	Posterior	secondary degeneration of B/L hip	17hrs	3	4
8	1402976	Posterior	AVN left side	15hrs	2	3
9	1408888	Posterior	secondary degeneration of right hip	19hrs	5	5
10	928086	Lateral	fracture of left hip joint	16hrs	4	5
11	1405138	Posterior	osteoarthritis right hip joint	18hrs	3	3
12	1414459	Posterior	secondary degeneration of hip left side	20hrs	5	5
13	1416751	Posterior	osteoarthritis right hip joint	20hrs	5	5
14	935926	Lateral	fracture of femur left side	19hrs	3	3
15	1418254	Posterior	osteoarthritis right hip joint	19hrs	3	4
16	1418272	Posterior	fracture neck of femur right side	18hrs	2	2
17	1422573	Lateral	fracture neck of femur left side	24hrs	3	4
18	1423246	Posterior	fracture femur left side	16hrs	5	5
19	719601	Lateral	AVN hip left side	20hrs	3	3
20	1403304	Lateral	secondary degeneration of left hip joint	17hrs	3	3
21	910472	Posterior	secondary degeneration of right hip joint	18hrs	3	4
22	1457198	Lateral	fracture neck of femur left side	19hrs	3	4
23	1117083	Posterior	secondary degeneration of left hip joint	19hrs	3	5
24	1466632	Posterior	secondary degeneration of right hip	18hrs	3	4
25	1394971	Posterior	AVN hip right	15hrs	3	4
26	1466632	Posterior	secondary degeneration of hip left side	20hrs	4	5
27	767889	Posterior	fracture neck of femur right side	15hrs	2	2

s no	MRD No	VAS (AT DYNAMIC MOBILISATION)		Weight bearing		VAS (AT REST)					VAS(AT DYNAMIC MOBILISATION)				
-	-	At 24hr	At 48hr	24hrs	48hrs	base line pre operative	O Mins	6 hrs	12hrs	24hrs	base line pre operative	O Mins	6 hrs	12hrs	24hrs
1	1062962	6	5	2	5	5	4	4	5	5	6	5	4	7	6
2	1365509	5	3	4	5	5	2	3	3	4	6	2	4	5	5
3	1373627	2	1	5	5	5	3	2	3	2	6	4	3	4	1
4	1373627	5	4	4	5	5	2	2	3	3	6	4	2	4	5
5	352446	4	4	5	5	6	2	2	2	3	7	2	3	3	4
6	1396542	4	2	5	5	5	2	3	4	3	6	3	4	5	4
7	1394971	4	3	5	5	5	3	2	3	3	6	4	3	4	4
8	1402976	5	4	3	4	6	2	3	4	4	7	2	4	6	5
9	1408888	2	2	5	5	4	1	2	2	2	5	3	2	3	2
10	928086	3	2	2	5	5	2	2	3	3	7	4	2	4	3
11	1405138	5	2	4	5	5	3	5	3	3	6	4	6	5	5
12	1414459	2	2	5	5	5	2	2	3	2	6	3	3	4	2
13	1416751	2	2	5	5	5	2	2	2	2	5	2	3	4	2
14	935926	5	5	4	5	6	2	3	3	4	7	4	4	4	5
15	1418254	3	2	5	5	5	2	2	4	2	5	3	3	5	3
16	1418272	7	6	2	3	6	3	5	5	6	7	5	6	5	7
17	1422573	4	4	4	5	6	2	2	3	3	7	4	3	3	4
18	1423246	3	2	5	5	6	3	3	3	2	7	3	4	3	3
19	719601	4	5	5	5	5	2	3	3	3	6	3	4	3	4
20	1403304	5	5	2	4	4	3	4	3	4	5	3	4	4	5
21	910472	4	4	2	5	5	2	3	3	3	6	3	4	4	4
22	1457198	4	3	5	5	6	3	3	4	3	7	4	4	5	4
23	1117083	4	3	5	5	5	1	2	2	3	6	2	3	3	4
24	1466632	5	4	4	5	5	2	4	3	4	6	4	5	4	5
25	1394971	4	3	4	5	5	2	2	3	3	7	3	2	4	4
26	1466632	3	2	4	5	5	1	1	3	3	6	2	2	4	3
27	767889	6	6	2	3	5	4	3	5	5	6	6	3	7	6

s no	MRD No	Time of first rescue analgesia	Amount and Type of rescue analgesia given				Total amount of rescue analgesia used			
-	-	-	0 min	6 hr	12 hr	24 hr	0 min	6 hr	12 hr	24 hr
1	1062962	1.5hrs	50	50	100	50	50	100	250	250
2	1365509	2hrs	50	50	50	50	50	100	150	200
3	1373627	2hrs	50	50	50	50	50	100	150	200
4	1373627	1hr	50	0	50	50	50	0	100	150
5	352446	1hr	50	50	50	50	50	100	150	200
6	1396542	3hrs	0	50	50	50	0	50	100	150
7	1394971	2hrs	50	50	50	50	50	100	150	200
8	1402976	2.5hrs	0	50	50	50	0	50	100	150
9	1408888	1.5hrs	0	0	50	50	0	0	50	100
10	928086	3hrs	50	0	50	50	50	50	100	150
11	1405138	2hrs	50	50	50	50	50	100	150	200
12	1414459	8hrs	0	0	50	50	0	0	50	100
13	1416751	7hrs	0	0	50	50	0	0	50	100
14	935926	1.5hrs	50	50	50	100	50	100	50	250
15	1418254	8hrs	0	0	50	50	0	0	50	100
16	1418272	1hrs	50	100	100	100	50	150	250	350
17	1422573	3hrs	50	50	50	50	50	100	150	200
18	1423246	2.5hrs	0	50	50	50	0	50	100	150
19	719601	2hrs	50	50	50	50	50	100	150	200
20	1403304	1.5hrs	50	50	50	100	50	100	150	250
21	910472	1hr	50	50	50	50	50	100	150	200
22	1457198	2hrs	50	50	100	50	50	100	200	250
23	1117083	3hrs	0	50	50	50	0	50	100	150
24	1466632	2hrs	50	50	50	50	50	100	150	200
25	1394971	2.5hrs	50	50	50	50	50	100	150	200
26	1466632	7hrs	0	0	50	50	0	0	50	100
27	767889	1hr	50	50	100	50	50	100	200	250

s no	MRD No	INITIALS	Age	Gender	Occupation	Employment Status	Date of Admission	Date of Discharge	Date of Procedure	Procedure	Group
-	-	-	-	-	-	-	-	-	-	-	With LIA/Without
28	1473083	N	28	Female	Dependent	Working	8/3/2023	13/03/2023	3/9/2023	THR right side	With LIA
29	1485856	KK	64	Female	Retired	Not working	22/03/2023	31/03/2023	23/03/2023	THR right side	Without LIA
30	1487270	SC	54	Male	Businessman	Working	25/03/2023	29/03/2023	25/03/2023	THR left side	With LIA
31	1488524	RRV	56	Female	Teacher	Working	27/03/2023	3/4/2023	28/03/2023	THR left side	Without LIA
32	1486309	HK	23	Female	Student	Working	30/03/2023	7/4/2023	3/4/2023	THR right side	Without LIA
33	1486988	KK	64	Female	Retired	Not working	31/03/2023	7/4/2023	1/4/2023	THR right side	Without LIA
34	413720	JJ	52	Male	Businessman	Working	12/4/2023	21/4/2023	13/4/2023	THR right side	With LIA
35	1511409	JS	46	Male	Dependent	Working	10/5/2023	16/05/2023	11/5/2023	THR left side	Without LIA
36	863910	AS	53	Male	Farmer	Working	16/5/2023	20/5/2023	17/5/2023	THR right side	Without LIA
37	1529952	JS	54	Male	Businessman	Working	6/6/2023	10/6/2023	7/6/2023	THR left side	With LIA
38	958807	AKS	59	Male	Businessman	Working	26/6/2023	3/7/2023	27/6/2023	THR left side	Without LIA
39	1546324	RK	43	Male	Dependent	Working	3/7/2023	8/7/2023	4/7/2023	THR right side	Without LIA
40	456537	KK	54	Female	Housewife	Not working	17/7/2023	22/7/2023	18/07/2023	THR left side	With LIA
41	1558314	SK	46	Male	Farmer	Working	24/7/2023	22/8/2023	5/8/2023	THR right side	Without LIA
42	1570568	RKV	78	Male	Retired	Not working	13/8/2023	16/8/2023	14/8/2023	THR right side	Without LIA
43	1581768	AJ	46	Male	Dependent	Working	8/9/2023	25/9/2023	9/9/2023	THR right side	With LIA
44	1591449	NK	73	Female	Retired	Not working	17/9/2023	22/9/2023	18/9/2023	THR right side	Without LIA
45	1593492	BS	57	Male	Farmer	Working	20/9/2023	26/9/2023	21/9/2023	THR right side	With LIA
46	1590850	CS	50	Male	Businessman	Working	25/9/2023	30/9/2023	26/9/2023	THR right side	With LIA
47	1598855	RN	49	Male	Businessman	Working	29/9/2023	3/10/2023	30/9/2023	THR left side	With LIA

s no	MRD No	Approach	Diagnosis	DURATION OF STAY IN POST OPERATIVE RECOVERY AREA (IN HRS)	Quadriceps muscle strength	
-	-	-	-	-	At 24hr	At 48hr
28	1473083	Posterior	AVN hip right side	16hrs	4	5
29	1485856	Posterior	secondary degeneration of hip right side	24hrs	3	3
30	1487270	Posterior	AVN hip left side	16hrs	4	5
31	1488524	Posterior	degeneration of hip left side	18hrs	2	3
32	1486309	Lateral	AVN right side	20hrs	4	5
33	1486988	Posterior	fracture neck of femur right side	42hrs	3	4
34	413720	Posterior	secondary degeneration of hip right side	19hrs	2	3
35	1511409	Posterior	secondary degeneration of hip left side	18hrs	5	5
36	863910	Lateral	secondary degeneration of hip joint	19hrs	2	3
37	1529952	Posterior	secondary degeneration of left hip	26hrs	3	4
38	958807	Posterior	AVN hip left side	15hrs	3	4
39	1546324	Posterior	AVN hip right side	18hrs	3	4
40	456537	Posterior	secondary degeneration of hip left side	15hrs	3	3
41	1558314	Posterior	fracture NOF right side	18hrs	4	5
42	1570568	Lateral	AVN hip right side	17hrs	2	2
43	1581768	Posterior	AVN B/L hip	18hrs	4	5
44	1591449	Lateral	fracture neck of femur right side	17hrs	3	5
45	1593492	Posterior	secondary degeneration	19hrs	3	4
46	1590850	Posterior	AVN hip right side	17hrs	5	5
47	1598855	Posterior	AVN left side	15hrs	3	4

s no	MRD No	VAS (AT DYNAMIC MOBILISATION)		Weight bearing		VAS (AT REST)					VAS(AT DYNAMIC MOBILISATION)				
-	-	At 24hr	At 48hr	24hrs	48hrs	base line pre operative	O Mins	6 hrs	12hrs	24hrs	base line pre operative	O Mins	6 hrs	12hrs	24hrs
28	1473083	3	2	5	5	6	2	3	2	2	7	2	4	3	3
29	1485856	4	4	5	5	6	3	3	3	3	7	4	4	3	4
30	1487270	2	2	5	5	5	1	2	3	2	6	3	2	4	2
31	1488524	6	5	4	4	5	3	5	5	5	6	4	6	5	6
32	1486309	3	3	5	5	4	3	2	2	3	6	5	2	3	3
33	1486988	5	3	5	5	6	2	4	4	4	7	3	5	4	5
34	413720	6	4	3	4	5	2	3	4	5	6	4	5	5	6
35	1511409	1	1	5	5	4	2	2	2	1	5	3	2	2	1
36	863910	6	5	3	4	4	4	6	5	5	6	5	7	6	6
37	1529952	4	2	5	5	4	2	2	3	3	6	2	2	4	4
38	958807	5	4	4	5	5	2	4	3	3	7	4	5	4	5
39	1546324	4	3	4	5	4	2	3	3	3	5	3	3	4	4
40	456537	3	2	5	5	5	1	2	3	2	7	1	2	4	3
41	1558314	4	2	5	5	6	2	2	2	3	7	3	3	2	4
42	1570568	6	5	3	4	5	3	5	5	5	7	4	6	5	6
43	1581768	3	2	5	5	6	1	2	2	2	7	2	2	3	3
44	1591449	5	4	4	4	5	4	2	3	3	6	6	4	4	5
45	1593492	4	3	5	5	5	2	2	3	3	6	3	2	4	4
46	1590850	2	1	4	5	4	1	2	3	2	6	3	2	3	2
47	1598855	4	2	5	5	4	2	2	3	3	5	3	3	5	4

s no	MRD No	Time of first rescue analgesia	Amount and Type of rescue analgesia given				Total amount of rescue analgesia used			
-	-	-	0 min	6 hr	12 hr	24 hr	0 min	6 hr	12 hr	24 hr
28	1473083	3hrs	0	50	50	50	0	50	100	150
29	1485856	2hrs	50	50	50	50	50	100	150	200
30	1487270	7hrs	0	0	50	50	0	0	50	100
31	1488524	1hr	50	100	50	50	50	150	200	250
32	1486309	2hrs	0	0	50	50	0	0	50	100
33	1486988	2hrs	50	50	50	50	50	100	150	200
34	413720	2hrs	50	50	100	50	50	100	200	250
35	1511409	3hrs	0	0	50	0	0	0	50	50
36	863910	1hrs	50	100	50	50	50	150	200	250
37	1529952	7hrs	0	0	50	50	0	0	50	100
38	958807	2hrs	50	50	50	50	50	100	150	200
39	1546324	1.5hrs	50	50	50	50	50	100	150	200
40	456537	8hrs	0	0	50	50	0	0	50	100
41	1558314	2.5hrs	50	50	0	50	50	100	100	150
42	1570568	1hr	50	50	100	100	50	100	200	300
43	1581768	8hrs	0	0	50	50	0	0	50	100
44	1591449	1hr	50	50	50	0	50	100	150	150
45	1593492	7hrs	0	0	50	50	0	0	50	100
46	1590850	8hrs	0	0	50	0	0	0	50	50
47	1598855	3hrs	0	50	50	50	0	50	100	150

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639-256232,256236
Tele/Fax : 01639-256235
Email – Thesisbfuhs@gmail.com

73

No. BFUHS/2K23p-TH/ 56 Date 1/1/24

The Principal
Dayanand Medical College & Hospital
Ludhiana

Subject:: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 25.09.2023 has approved the plan of thesis of **Manvir Singh**, a student of your college for **MS Orthopaedics** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Comparison of functional outcome and pain assessment in patients given local infiltration analgesia and not given local infiltration analgesia in total hip arthroplasty.

Supervisor	**Co-Supervisor:-**	**Co-Supervisor:-**
Dr. Pankaj Mahindra Prof., Dept. of Orthopaedics	Dr. Harpal Singh Selhi, Professor Dept. of Orthopaedics	Dr. M. Rupinder Singh Professor Dept. of Anaesthesiology

The student may submit the thesis in triplicate alongwith the plan in triplicate also, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

Controller of Examinations

Note :

1 *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*

3255

COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED IN

PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MS

In

ORTHOPEDICS

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

AUGUST, 2022

DR MANVIR SINGH

DEPARTMENT OF ORTHOPEDICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY
For the degree of	MS Orthopedics
Name of the candidate	Dr. Manvir Singh
Supervisor	Dr. Pankaj Mahindra, Professor, Department of Orthopedics, DMCH, Ludhiana
Co-Supervisor	Dr. Harpal Singh Selhi, Professor, Department of Orthopedics, DMCH, Ludhiana Dr. M. Rupinder Singh, Professor, Department of Anaesthesia, DMCH, Ludhiana
Institution	Dayanand Medical College and Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Implantation of prosthesis for total hip arthroplasty is often accompanied with severe inflammation resulting in high intensity of pain. Immediate reduction of this pain might be an important factor in early recovery process. Effective pain control can quicken the recovery time and reduce the length of hospital stay and progressively found patient to go home earlier.

Aim of Study: Comparision of functional outcome and pain assessment in patient given local infiltration analgesia and not given local infiltration analgesia in total hip arthroplasty

Materials & methods: Patient scheduled for total hip replacement surgeries under combined spinal and epidural anesthesia and receiving lia intra operatively and cognitive ability to comprehend vas scale.

Clinical Significance: Total hip arthroplasty (THA) is one of the most cost-effective and consistently successful surgeries performed in orthopedics. It provides reliable outcomes for patients suffering from end-stage degenerative hip osteoarthritis. specifically, it results in pain relief, functional restoration, and improved quality of life.

Patient having hip degeneration are usually elderly with multiple co morbidities and experience varying intensity of pain necessitating the use of either parentral or central neuraxial techniques like continuous epidural analgesia for postoperative pain relief. Effective pain control can quicken the recovery time and reduce the length of hospital stay.

Keywords: Total hip arthroplasty, pain management , local infiltration of analgesia.

(Signature) Candidate	(Signature) Co-supervisor	(Signature) Co-supervisor	(Signature) Supervisor	(Signature) Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY"** exist in the Department of Orthopedics at Dayanand Medical College and Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

Dr. Pankaj Mahindra
Professor
Department of Orthopedics
DMCH, Ludhiana

Co-Supervisor's

Dr. Harpal Singh Selhi
Professor
Department of Orthopedics
DMCH, Ludhiana

Dr. M. Rupinder Singh
Professor
Department of Anaesthesia
DMCH, Ludhiana

Head of the Department

Dr. Rajnish Garg
Professor & Head
Department of Orthopedics
DMCH, Ludhiana

Place: _____

Date: _____

APPROVAL PROFORMA
BY RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Manvir Singh
Department	MS ORTHOPEDICS
Topic of Thesis	COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY
Likely date of appearing in PG examination	May/June, 2024
Date of enrollment	05 March 2022
Name of Head of Department	Dr. Rajnish Garg
1) Supervisor **2) Co-Supervisor**	Dr. Pankaj Mahindra Dr. Harpal Singh Selhi Dr. M. Rupinder Singh
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)	Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal & Professor & Head, Cardiology)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / ~~No~~

Dr. Sandeep Puri
Chairperson
Research Committee
Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee
Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	MANVIR SINGH 46 Golflink Colony, Hambran Road ,Ludhiana
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL
3	COURSE OF STUDY AND SUBJECT	MS ORTHOPEDICS
4	DATE OF ADMISSION OF COURSE	05/03/2022
5	TITLE OF THE TOPIC	COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Total hip arthroplasty (THA) is one of the most cost-effective and consistently successful surgeries performed in orthopedics. It provides reliable outcomes for patients suffering from end-stage degenerative hip osteoarthritis. Specifically, it results in pain relief, functional restoration, and improved quality of life.

The most common indication for THA includes end-stage, symptomatic hip osteoarthritis(OA). In addition, hip osteonecrosis(ON), congenital hip disorders including hip dysplasia, and inflammatory arthritic conditions are not uncommon reasons for performing THA.[1]

Patient having hip degeneration are usually elderly with multiple co morbidities and experience varing intensity of pain necessitating the use of either parentral or central neuraxial techniques like continuous epidural analgesia for postoperative pain relief.[2] Both these modalities are fraught with adverse side effects like drowsiness or motor block which may adversely affect dynamic pain relief and rehabilitation. Therefore the need for effective postoperative pain control after hip surgeries has led to the development of numerous regional analgesic technique like local infiltration of anesthesia, epidural injection, intrathecal morphine etc.

Implantation of prosthesis for total hip arthroplasty is often accomplained with severe inflammation resulting in high intensity of pain.

Immediate reduction of this pain might be an important factor in early recovery process.

One of the strategy to reduce morbidity and mortality include local infiltration analgesia.

Effective pain control can quicken the recovery time and reduce the length of hospital stay and progressively found patient to go home earlier.[3]

Local analgesia (LIA) using a combination of large volume local anesthetics (LA) and non-steroidal anti-inflammatory drugs (NSAIDs)

injected systematically peri-articularly has been used for pain management with variable success.

The use of NSAIDs administered orally or systemically during orthopedic surgery has been controversial due to the risk of delayed healing from inhibition of osteoclast and osteoblast formation.[4]

There is no gold standard for LIA. Briefly, it consist of a local anesthetic, non steroidal anti-inflammatory drug and adrenaline; some authors have added morphine and/or steroid to the mixture. Most studies have used ropivacaine as local anesthetic, while some used bupivacaine.[5]

Compared with bupivacaine , ropivacaine and levobupivacaine have slightly lower anaesthetic potency ; however they exhibit lower central nervous system and cardiovascular toxicity. There is increased trend for using ropivacaine or levobupivacaine in LIA, rather than bupivacaine.[5]

Because of the variations in LIA, it is difficult to identify the ‘most effective’ component or components. Thus, further studies are needed to support standardization of LIA and its use along with combined spinal and epidural anesthesia.

6.2 REVIEW OF LITERATURE

Implantation of prosthesis for total hip arthroplasty is often accomplained with severe inflammation resulting in high intensity of pain .Immediate reduction of this pain might be an important factor in early recovery process. Poor pain control may lead to major discomfort for the patient and also impaired early mobilization. Immobilization of the patient leads to increased time spent in bed which increases the risk of deep vein thrombosis and resulting prolonged hospital stay.

Initially recognized and conventional simple methods for post-operative (total hip arthroplasty) pain management is opioid administered intravenously either as intermittent boluses or as patient controlled analgesia infusion. However, large doses of opioids are often required which increases the risk of side effects, such as sedation, post-operative delirium, nausea, vomiting, respiratory depression. Epidural analgesia was being widely used for post operative pain management following total hip arthroplasty. Epidural anaesthesia with an indewelling catheter prolongs pain relief, but can lead to serious and rare complications such as epidural hematoma, nerve damage, catheter displacement or epidural infection.

Among the local anesthesia agents, ropivacaine has been reported to be associated with a lower incidence of motor block than bupivacaine, thereby would further support early mobilization in the post-operative period.[6]

Local infiltration analgesia was first described by kerr and kohan in Australia in 2008. It involves use of a mixture of an anesthetic drug and a non steroidal anti inflammatory drug, to which adrenaline or a corticosteroid can be added.[5]

A study done by Sandri M et al(2020) evaluated the efficacy of perivascular nerve block and local infiltration analgesia combination as the only anaesthesia technique for total hip arthroplasty.

McCarthy et al conducted a randomized controlled trail and revealed that lia conferred superior analgesia to intrathecal morphine following THA in patients.[7]

According to Casati and Putzu , ropivacaine and levobupivacaine were developed to avoid bupivacaine-related severe toxicity.

Saeid safari had done their study which revealed that adding ketorolac to the ropivacaine and epinephrine via LIA technique decreased the postoperative pain score and opioids consumption; the addition of epinephrine helps to reduce the toxicity of the local anesthetic by keeping it localized to the area of injection.[8]

Local infiltration analgesia (LIA) is a simple, surgeon-administered technique for pain relief after THA and TKA. This technique has been reported to provide satisfying pain control and little adverse events.There have been several randomized controlled trials (RCTs) that compared the efficacy of LIA with intrathecal morphine or epidural analgesia in patients after THA and TKA. However, their results remained controversial. Andersen et al compared the efficacy of epidural analgesia with intraoperative periarticular injection (including ropivacaine, ketorolac, and epinephrine) plus intraarticular infusion (including ropivacaine and ketorolac). They concluded that the latter technique provided better pain relief and less morphine consumption than the former treatment.[9]

Yadeau et al compared periarticular injection with epidural analgesia combined with femoral nerve blockade. They found that the LIA had similar postoperative pain scores at rest as compared with epidural analgesia.In a clinical trial that compared LIA with intrathecal morphine, Essving et al reported that LIA improved analgesia during the first few days postoperatively, as compared with intrathecal morphine.

Anderson et al. undertook a prospective randomised, double-blind, controlled trial to investigate the effect of local infiltration followed by continuous intraarticular infusion for 24 hours postoperatively in 37 patients undergoing hip replacement surgery. The study group received local infiltration of ropivacaine, ketorolac, and adrenaline followed by an intra-articular infusion of the same three drugs for 24 hours postoperatively. The control group received saline solution in equal volumes to the study group. The study group reported less pain for the first 2 weeks postoperatively and reduced breakthrough

analgesic requirements. This was associated with significantly less joint stiffness and better physical function, but whilst there was a trend towards earlier discharge in the study group, this was not statistically significant. Again, no adverse events were reported in the study group.[10]

The interdisciplinary process(LIA) optimization of all treatment pathways can lead to a shortening of hospital stay without affecting the quality and results of the treatment.[11]

6.3 AIMS AND OBJECTIVES OF THE STUDY

- To compare functional outcome of patient being given combined spinal and epidural anesthesia with and without local infiltration of analgesia (LIA)
- To evaluate efficacy and safety of local infiltration of analgesia (LIA) on post-operative pain management in patient undergoing total hip replacement

7. MATERIALS AND METHODS

- After obtaining clearance and approval from the institutional ethical committee, patients fulfilling the inclusion / exclusion criteria will be included in the study after obtaining informed consent.
- Detailed history will be obtained using study proforma with special attention to evaluations including base line clinical features, examination of other associated symptoms will be based on history and physical examination.
- Administration of LIA :

  Injection into the tissues around rim of acetabulum focusing on joint capsule and around exposed gluteal and adductor muscles

  Injection into external rotators , gluetous tendon , iliotibial band

  Injection into subcutaneous tissues under the wound

7.1 Source of Data:

The source of patients for the present study will be the inpatients in department of Orthopedics, Dayanand Medical College & Hospital, Ludhiana from September 2022 to September 2023 who have given valid informed consent to take part in the study.

7.2 METHOD OF COLLECTION OF DATA

- Inclusion Criterion

1. Patient scheduled for total hip replacement surgeries under combined spinal and epidural anesthesia and receiving local infiltration of anesthesia intraoperatively
2. Cognitive ability to comprehend vas scale

- Exclusion Criterion

1. Allergy to local anesthetic drugs
2. Use of opioids for chronic analgesia
3. Patient of revision THR

- Duration of Study/ Number of Cases

Prospective study to be done over the period of one year

- Outcome

PRIMARY OUTCOME:

1. Functional mobility will be assessed by:

   QUADRICEPS MUSCLE STRENGTH: the most commonly accepted method for evaluating the muscle strength i.e. The Oxford Scale Aka Medical Research Council Manual Muscle Testing (MMT) scale will be used where quadriceps muscle strength will be assessed at 24 and 48 hours against the resistance and gravity, hence grading the patient's strength on a 0 to 5 scale accordingly[12]

   Grade 0- complete inability to contract the muscle

   Grade 1- only a slight contraction or flicker of muscle

   Grade 2- moving leg through its complete range of motion, but only in a horizontal plane, not against the pull of gravity

   Grade 3- able to hold leg up off the table against the pull of gravity, but not able to withstand any additional pressure

   Grade 4- able to hold up leg actively against gravity and some resistance

   Grade 5- actively holding up leg against gravity and strong resistance

2. WEIGHT-BEARING: After total hip arthroplasty, it is of utmost importance for recovery to get the right amount of weight-bearing when moving around using walkers.

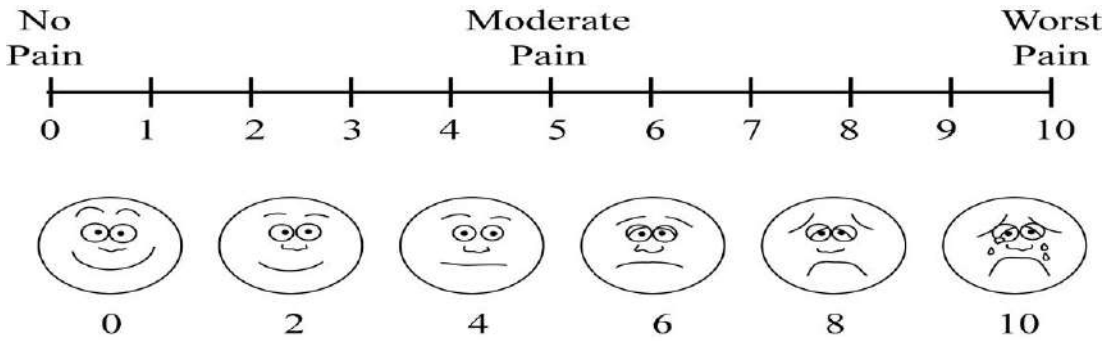
   We will access the patient ability to bear max weight at 24hrs and 48 hrs after the procedure.[13]

Weight Bearing Grades

- Non-weight bearing means the leg should not touch the floor or support any bodyweight. The patient uses one leg, and crutches are essential.
- With touch down weight-bearing, the toes of the foot can touch the floor to maintain balance only. At no time should the individual place weight on the leg.

- With partial weight-bearing, a small amount of weight is permissible on the affected extremity. The weight gradually increases so that the patient can ambulate but still needs the use of an ambulatory device like a cane or crutches.
- With weight-bearing as tolerated, the individual may support 50% to 100% of body weight on the extremity. The amount of weight depends on the circumstances.
- With full weight-bearing, the affected leg can carry the entire weight of the body and can ambulate

3. Postoperative pain will be measured using VAS pain scores at 24 hours at rest in both the groups where a VAS score of 0 will indicate 'no pain at all' to VAS score of 10 indicating 'the worst pain ever possible.[14]



- **SECONDARY OUTCOME**:

1. The total analgesic drug requirement in first 24 hours will be compared for both the groups.

2. The time for need of first rescue analgesia will be compared in both the groups.

STATISTICAL ANALYSIS

Data will be described in terms of range; mean ± standard deviation (± SD), median, frequencies (number of cases) and relative frequencies

(percentages) as appropriate. To determine whether the data is normally distributed, a Kolmogorov-Smirnov test will be used. Comparison of quantitative variables between the study groups will be done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test will be performed and fisher exact test was used when the expected frequency is less than 5. A probability value (p value less than 0.05 will be considered statistically significant. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

The study does not require any investigation or intervention other than those routinely done for every patient hip surgeries.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Yes, attached herewith.

8. LIST OF REFERENCES

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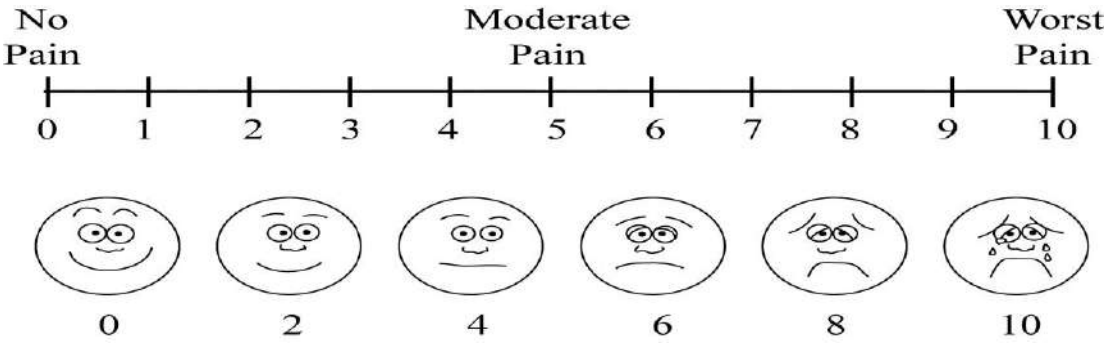
PROFORMA

S. NO.

- NAME: AGE: SEX:
- ADM No: MRD No:
- FATHER'S /HUSBAND'S NAME:
- ADDRESS:
- OCCUPATION:
- **EMPLOYMENT STATUS** – WORKING/NOT WORKING
- DATE OF ADMISSION:
- DATE OF DISCHARGE:
- DATE OF OPERATION/PROCEDURE:
- FINAL DIAGNOSIS :

- OPERATION/PROCEDURE: TOTAL HIP ARTHROPLASTY
- ANAESTHESIA USED: COMBINED SPINAL AND EPIDURAL ANESTHESIA- WITH LIA / WITHOUT LIA
- APPROACH : LATERAL/POSTERIOR/OTHER
- DURATION OF STAY IN POST OPERATIVE RECOVERY AREA (IN HRS)

Signature of Candidate **Signature of Supervisor**



TIME SINCE LIA WAS GIVEN	TIME	VAS (AT REST)	VAS (AT DYNAMIC MOBILISATION)	TIME OF FIRST RESUCE ANALGESIA GIVEN	AMOUNT AND TYPE OF RESCUE ANALGESIA GIVEN	TOTAL AMOUNT OF RESCUE ANALGESIA USED
➢ BASELINE(PREOPERATIVE) ➢ 0 MINS (ON ARRIVAL IN POST ANESTHESIA CARE UNIT) ➢ 6HR ➢ 12 HR ➢ 24HR						

Signature of Candidate **Signature of Supervisor**

		GRADE
Quadriceps muscle strength (Grade 0-5)	At 24 HR At 48 HR	
Weight bearing (Grade 1-5)	At 24 HR At 48 HR	

Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I…….D/o, W/o, S/o……..…… am willing to participate in the study **"COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

……. ……
Signature of the Witness Signature of the patient

Name:

Signature of Candidate **Signature of Supervisor**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य "**COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

“COMPARISON OF FUNCTIONAL OUTCOME AND PAIN ASSESSMENT IN PATIENTS GIVEN LOCAL INFILTRATION ANALGESIA AND NOT GIVEN LOCAL INFILTRATION ANALGESIA IN TOTAL HIP ARTHROPLASTY” ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____	_____
ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ	ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ
ਮਿਤੀ_____	ਮਿਤੀ_____
ਪਤਾ _____	ਪਤਾ _____

_____
ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ